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USSR Report

CHEMISTRY



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CHEMISTRY

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AEROSOLS

UDC 541.182:541.18.043

GRAVITATIONAL SEDIMENTATION OF AEROSOL PARTICLES FROM LAMINAR FLOW BETWEEN TWO COAXIAL CYLINDERS

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 120, No 2, Nov 85 (manuscript received 11 May 84) pp 293-296

[Article by G.I. Sanadze, All-Union Scientific Research Institute of Labor Protection, All-Union Central Trade Union Council]

[Abstract] Analytical expressions for effectiveness of full gravitational sedimentation of aerosol particles on the inner surface of an outer cylinder and the outer surface of an inner cylinder from laminar flow of an aerosol, flowing between the two coaxial cylinders with radii R_1 and R_2 ($R_1 < R_2$), are derived and discussed. Ratios between the radius of aerosol particles and parameters of the channel for which complete sedimentation is realized, are determined. Figures 2; references 2 (Russian).

2791/13046
CSO: 1841/482

UDC 550.42;551.510.41

BORON, BROMIUM AND IODINE IN AEROSOLS AND ATMOSPHERIC PRECIPITATION OVER INDIAN OCEAN AND PACIFIC OCEAN

Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 120, No 1, Oct 85 (manuscript received 15 Mar 84) pp 121-124

[Article by G.D. Supatashvili and G.A. Makharadze, Tbilisi State University]

[Abstract] Materials obtained during scientific research ship cruises in the central and southern Pacific Ocean, in the northwestern Indian Ocean and materials from the Black Sea littoral were used to study the role of aerosols of oceanic origin in migration of thalassic elements and to assess the mechanism of their entrance into the atmosphere. Analysis of data obtained, in a gradient of meteorological parameters, showed a close direct relationship between wind velocity and consequent waves and B, Br, and I levels in

the aerosols. Wind velocity of 4-5 m/s produces an abrupt increase of concentration of the trace elements because of extensive spray formation on the crest of waves. In closeness of the connection between B, Br, and I concentrations in the aerosols and wind velocity, the elements are ranged in a series corresponding to that in sea water (Cl-B-Br-I) and the ratio of the trace elements to chlorine gradually decreases with increase of wind velocity and reaches the values found for them in sea water. Air temperature and water temperature did not significantly affect the trace element levels in aerosols. Precipitation greatly reduces the B, Br, and I levels in aerosols and they sometimes reach analytical zero. Regional distribution of the trace elements correlate with the wind regime. The connection between the trace elements level in atmospheric precipitates and weather conditions in these regions is clearly established. Figures 2; references 10: 9 Russian, 1 Western.

2791/13046

CSO: 1841/482

ALKALOIDS

UDC 547.94

SYNTHESES BASED ON ANABASINE

Tashkent UZBEKSKIY KHIMICHESKIY ZHURNAL in Russian No 6, Nov-Dec 85
(manuscript received 4 Jul 84) pp 33-36

[Article by R.A. Zaidova, K.S. Tillyayev and I.M. Primukhamedow, Tashkent
Pharmaceutical Institute]

[Abstract] Synthesis of possibly physiologically-active substances synthesized from anabesine is discussed. Interaction of anabesine with acid chlorides of monochloroacetic, ortho-methoxybenzoic, para-nitrobenzoic and meta-nitrobenzoic acids, and with maleic acid anhydride produced N-monochloroacetyl anabesine, N-ortho-methoxybenzoyl anabesine, N-para-nitrobenzoyl anabesine, N-maleinyl anabesine, and N-meta-nitrobenzoyl anabesine. Structure of these compounds was determined by infrared spectroscopy and mass spectroscopy. Each compound is discussed in some detail. References 12 (Russian).

2791/13046
CSO: 1841/486

UDC 547.813.814.833.9.07

2-BENZOPYRYLIUM SALTS. NEW APPROACH TO SYNTHESIS OF NATURAL ALKALOID SALSOLIDINE WITH USE OF 2-BENZOPYRYLIUM SALTS

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 6, Nov-Dec 85
(manuscript received 10 Jan 85) pp 815-818

[Article 29 is by I.V. Shcherbakova, V.G. Brovchenko and Ye.V. Kuznetsov,
Scientific Research Institute of Physical and Organic Chemistry, Rostov
State University imeni M.A. Suslov]

[Abstract] Interaction of 1-methyl-6,7-dimethoxy-2 benzopyrylium perchlorate with ammonia and primary ions, studied by paramagnetic resonance spectroscopy, infrared spectroscopy, and element-by-element analysis, is described and discussed. The possibility of using 2-benzopyrylium salts to synthesize natural isoquinoline alkaloids such as salsolidine, especially, is demonstrated. Interaction of 1-methyl-6,7-dimethoxy-2-benzopyrylium

salt and ammonia forms corresponding isoquinoline salts and naphthylamides. Reduction of 1-methyl-N-benzyl-6,7-dimethoxy-isoquinoline by sodium boron hydride yields the corresponding tetrahydroisoquinoline and hydrogenolysis of this yields salsolidine. References 12: 4 Russian, 8 Western.

2791/13046
CSO: 1841/483

UDC 547.944/945

SEARCH FOR WAYS TO SYNTHESIZE 1,9,10-TRIMETHOXY-2,3-METHYLENedioxy-APORPHINE

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 6, Nov-Dec 85
(manuscript received 14 Feb 85) pp 818-823

[Article by V.I. Vinogradova and M.S. Yunusov, Order of Labor Red Banner Institute of Chemistry of Plant Substances, UzSSR Academy of Sciences, Tashkent]

[Abstract] Development of a method of producing 2,3-methylenedioxy-4-methoxybenzaldehyde which ensures production of a good yield of the corresponding phenylethylamine is described and discussed. The method involves bromination of isovanillin with substitution of the haloid by a hydroxyl group and methylation (of diphenol) which gives a 35-40 percent yield. Some substituted benzylidene- and benzyltetrahydroisoquinolines are synthesized and discussed. Irradiation of these substances produces N-dealkylation, accompanied by oxidation processes. References 14: 4 Russian, 10 Western.

2791/13046
CSO: 1841/483

MASS-SPECTROMETRIC ANALYSIS OF MIXTURES OF INORGANIC GASES

Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 41, No 2, Feb 86
(manuscript received 8 Oct 84) pp 197-219

[Article by I.L. Agafonov, Scientific Research Institute of Chemistry of the Gorkiy State University imeni N.I. Lobachevskiy]

[Abstract] This article reviews the current state of mass spectrometric analysis under several main headings. For research on flames and reactions in the gaseous phase, the article reviews literature, mostly from the 1970's, on methods of analyzing short-lived compounds, including the use of magnetic fields and laser excitation. For research on atmospheric composition, articles from the late 1970's and early 1980's paid much attention to determination of trace pollutants and freons and included the use of gas chromatography, both alone and in conjunction with ionization and quadripole methods. These methods can determine gases present in air at levels of $1 \mu\text{g}/\text{m}^3$ in 0.1 ml samples. Negative-ion approaches allow determination of concentrations of oxygen-containing compounds and halogens to 10^{-14} - $10^{-7}\%$. Transportable radio-frequency monopole mass spectrometers have been effective for geochemical investigations. Magnetic resonance approaches allow direct determination of ratios of rarer isotopes of the inert gases. Investigation of the upper atmosphere and planetary atmospheres is based on mass spectroscopy. A classification scheme of atmospheric layers is used as the basis for reviewing 25 years of atmospheric analysis. Mass spectrometers on satellites and balloons addressed the problems of low concentrations and high relative velocities by developing such unique methods as the diffusion of gases through a heated metallic membrane. Atmospheric modeling included the effect of metal atoms and complex hydrated ions. Satellites in high orbit provided data for developing a scheme of the earth's magnetosphere. Similar instruments were used for determinations of the upper atmosphere of Mars and the atmosphere of Venus, including inert gases and isotope ratios. Industrial applications of mass spectroscopy include automatic control processes in metallurgical and chemical plants and nuclear reactors, as well as the determination of composition of engine exhaust gases. Wider applications require smaller and cheaper instruments, which can be achieved partly by the use of new materials, such as titanium alloys for measurement chambers. Quadripole instruments are receiving wide application and can be adapted to miniaturization. Specialized mass spectrometers can be designed for such applications as kinetic research and, particularly tandem mass

spectrometers, for trace quantities in pure gases and in the atmosphere. A concluding table summarizes the present achievable limits of detection for various applications. Figures 2; references 178: 1 Hungarian, 2 Romanian, 81 Russian, 94 Western.

12672/13046

CSO: 1841/498

CATALYSIS

UDC 541.128

CATALYTIC ACTIVITY OF BENZOLATED POLYMETHYLENEFERROCENYLENE

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 30, No 2, Feb 86
(manuscript received 2 Apr 85) pp 150-153

[Article by Ya.M. Paushkin, academician, Belorussian SSR Academy of Sciences, G.K. Berezovik and R.I. Belskaya, Institute of Physical Organic Chemistry, Belorussian SSR Academy of Sciences]

[Abstract] The catalytic activity and selectivity of insoluble benzolated polymethyleneferrocenylene (PMF) were studied in the dehydrogenation of cyclohexanol (I) to cyclohexanone (II). The PMF, prepared by the Friedel-Crafts reaction, contained 71.40% C, 5.13% H, and 21.02% Fe; various physical and chemical properties of the catalyst are given. Fourteen experiments were made at 260-460°C for 1 hour with PMF of 0.10-0.70 mm. Wt. % of (I) and (II) was reported from chromatographic analysis, the % selectivity was the sum of the two values. PMF showed significant catalytic activity and selectivity at 420-450°C with 22.3-49.6% (II) and 100-99.2% selectivity, respectively. Yield of (II) was only 1.0-10.0% with 100% selectivity at 260-380°C. The increased activity at the high temperatures was attributed to the ferrocene form of Fe. Thermograph and thermogravimetric (wt. loss) curves for PMF at 80-1000°C in air are given and they support the ferrocene formation. The activation energy (E) calculated for the PMF catalyst was 16 kcal/mol. E of PMF was compared with a series of metallic catalysts (CuAl, Cu, Fe, Zn-Fe, and Zn) previously reported for the dehydrogenation of (I) to (II). E for PMF fits the straight line data well and is lower than that for the iron catalysts. Figures 2, tables 2; references 14: 9 Russian, 1 Polish, 4 Western.

12886/13046
CSO: 1841/491

CHEMICAL INDUSTRY

FLEXIBILITY IN INDUSTRIAL CHEMICAL PROCESSES

Moscow KHIMIYA I ZHIZN in Russian No 2, Feb 86 pp 30-35

[Article by M.Ye. Ostrovskiy, candidate of chemical sciences and S.V. Blinkov, candidate of architecture]

[Abstract] Plants with flexible technology are important components of national economy. In chemical and petrochemical industries there is a 8-10 year gap between technical discovery and practical implementation. Flexible industrial plants were based in the past on rapid reconstruction but this approach is not adequate any more. Entire technologies must be developed to permit rapid transfer of new findings without reconstruction of the plant. In each industry special processes should be identified which could be subject to repeated technological changes, especially those of limited capacity. In such productions there are typical stages which occur in a pattern: preparation of starting materials, synthesis, and isolation/purification of the product. Rational placement of various reactors should make it possible to proceed from one product to another with minimal time loss. Along with proper placement of equipment, the communication-control system must be developed permitting central switching of various components according to changing production sites. In the plants themselves, the internal walls should be minimized, columns should be spaced widely apart with support frameworks for adjustable instrumentation. In-plant transportation equipment must be available. Figures 3.

7813/13046

CSO: 1841/445

DEVELOPMENTS BY MACHINE BUILDERS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 86
pp 44-46

[Article by Yu.N. Levitskiy]

[Abstract] A number of improved machines are discussed, all of them resulting from developmental work performed by machine construction workers. The list includes: equipment for purifying gas emissions from varnishing lines; a compressor for air supply free of mechanical impurities and moisture; electric pump for transportation of chemically-reactive liquids; transportable refrigerator for temporary storage of fruits and vegetables on the fields; a cryopreservation unit for animal semen, for biological specimens, embryos, and cells including controlled thawing capability; and containers for transportation of liquid nitrogen. The article is a sort of catalog of products developed. Figures 1.

7813/13046
CSO: 1841/472

UDC 661.721.4"313"+[661.721.4:339.4]"313"

PROGNOSIS FOR PRODUCTION AND UTILIZATION OF METHANOL

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 86 pp 113-117

[Article by O.B. Braginskiy and E.B. Shlikhter]

[Abstract] Limited reserves of petroleum and increased costs make methanol a universal source of energy and chemical starting material. There are many reasons for methanol to become the most interesting alternative to petrochemical energy. Currently, an intensive effort is placed on production of methanol from natural gas because of the innumerable ways of utilizing methanol. A model was prepared for analysis of the effectiveness of utilizing methanol as a substitute for the accepted resources for energy and crude materials. Many pros and cons of the utilization of methanol were analyzed. A conclusion was reached that in light of increased investments, the production and utilization of methanol will be increasing. References 20: 7 Russian (1 by Western authors), 13 Western.

7813/13046
CSO: 1841/494

FUNCTIONAL-COST ANALYSIS AS INSTRUMENT OF INTENSIFICATION OF CHEMICAL PRODUCTIVITY

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 86 pp 117-119

[Article by L.P. Strakhova and T.V. Lebedeva]

[Abstract] Functional-cost analysis (FCA) is one of the most promising methods of economic analysis of the performance of a given project. It is based on engineering-logical analysis, study of the functional properties, optimization of qualitative and quantitative characteristics with consideration of the users' need, and decrease in the cost. FCA assists in development of technical and organizational solutions assuring optimal relationship between qualitative parameters and their economic justification. In 1982, the State Committee on Science and Technology approved the methodology for FCA in seven stages which are described in this paper: preparatory stage (selection of the object and technical-economic justification); information stage (collection of data on project); creative stage (formulation of execution variants); analytical stage (formulation of all possible functions); research (development, calculation, and selection of the most rational variants); recommendation (final decisions, justification of recommendations); introduction (development of scientific-technological documentation, evaluation of economic effectiveness). The FCA is not being used in practice as yet. It is suggested that one could take an example from foreign socialist countries where this principle is applied daily with high degree of success. References 5 (Russian).

7813/13046

CSO: 1841/494

CZECH ECONOMIC PROGRESS

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 86 pp 124-125

[Article by N.M. Zybin]

[Abstract] The exhibition "Czechoslovakia--85" reflects Czech social and economic achievements during the past 40 years. Chemical industry is one of the leading industries; the CSSR is not rich in resources, so the crude material must be imported from the USSR. A new tendency is reflected in the development of Czech chemistry. In 84 a conglomerate was organized in Brno--"Lakhema" to coordinate production of special chemicals. Currently, it produces over 8,000 items, 2,000 of which are exported. It is one of the largest concerns in the Eastern Bloc. Of great importance to Czech economy are the agreements with USSR on mutual supplies of chemical products; a long-term cooperation in economical and scientific-technological areas was signed by G. Husak and M. Gorbachev at the opening of the exhibit. Large-scale plants are developed by Soviet specialists and fine

chemicals plants by the Czechs. A plant was built recently for production of diaphen FP which should make the socialist countries independent of the imports from the West. Cooperative work between these two countries produced a subvulcanization retardant cyclohexylthiophthalimide used in rubber industry; great progress is being made in the field of fiber glass.

7813/13046

CSO: 1841/494

REORGANIZATION OF AZERBAYDZHAN CHEMICAL INDUSTRY

Baku BAKINSKIY RABOCHIY in Russian 26 Mar 86 p 2

[Article by Staff]

[Abstract] Detailed analysis of the Azerbaydzhan chemical and petrochemical industry was reported at the 31st Session of the Azerbaydzhan Communist Party noting that many plants were not performing at optimal levels; projected growth rates reached barely 50% of the expected goals and other technical-economical indices deteriorated. An interview was reported with the Director, Sumgait Branch of the State Scientific Research Institute of Chlorine Projects, Candidate of Chemical Sciences V. Gasan-Zade, on these concerns. He verified a rather unsatisfactory state of Sumgait chemical industry; production methods are outdated, the technical-economic indices are low, there exists a problem in water-energy balance. Planning sessions are held constantly, and various plans are reviewed to improve the situation before year 2000 by concentrating on the processing of olefins, controlling water utilization, and pushing specialization in certain areas most advantageous to the local situation. Some of the projects must be totally reorganized; however, delays will continue occurring routinely in the implementation of even the best plans. One of the corrective steps would concentrate on methods which require no chlorine as a reagent. In order to achieve the projected goals, influx of young scientist-specialists with good industrial experience is needed. It is absolutely necessary to get support from the academic cadres to solve some of these applied problems.

7813/13046

CSO: 1841/518

IMPLEMENTATION AND REFINEMENTS IN BRIGADE FORM OF ORGANIZATION OF LABOR AT UKRAINIAN SSR REFINERIES AND PETROCHEMICAL PLANTS

Moscow KAUCHUK I REZINA in Russian No 2, Feb 86 pp 30-33

[Article by Yu.A. Danilov]

[Abstract] The new approach of organizing workers into brigades with either a narrow or a broad assignment scope has been shown to be an effective method of improving production quality and in enhancing productivity. Success with this approach at Ukrainian SSR refineries and petrochemical plants is reflected in the figures for the first 10 months of 1985, which demonstrate that the value of production exceeded planned figures by 23.8 million rubles and that productivity increased by 1.8%. By October 1, 1985, some 73% of the workers at Ukrainian refineries and petrochemical plants had been organized into teams (versus a figure of ca. 50% in 1980), with 61.1% of the workers in teams in which pay is predicated strictly on production. However, difficulties are encountered in certain cases where the new approach is not fully appreciated or where the foundations have not been properly prepared. In a number of cases, teams have been instituted merely as formal work units with emphasis on quantity rather than quality. In other cases, the team concept falls short due to its narrow scope which does encompass all of the branches and departments of a plant, while in others pay is based on individual efforts rather than on that of the team as a whole. Despite the difficulties, experience to date shows that the quality circle approach is clearly the way of the future. References 1 (Russian).

12172/13046
CSO: 1841/512

UDC 547.915.615.3.547.918:547.926.547.944/945

RESULTS OF WORK OF UzSSR ACADEMY OF SCIENCES INSTITUTE OF CHEMISTRY OF PLANTS IN 11TH FIVE-YEAR PLAN

Taskent UZBEKSKIY KHMICHESKIY ZHURNAL in Russian No 6, Nov-Dec 85, pp 23-27

[Article by A.I. Glushenkova]

[Abstract] Studies conducted by the institute followed two basic trends: chemical and biological study of preparations of plant origin with development of a technology of preparations for the medical industry and other sectors of the national economy and search for and development of new highly effective plant protection chemical agents. Work performed in the last 5 years included study of 150 species of plants, isolation of 570 natural compounds, including 200 new ones, determination of the structure of 180 compounds, and provision for pharmacological study of 350 preparations and phytotoxicological study of more than 200 preparations. Medicines

developed and clinical tests now underway at the collective are listed and discussed briefly. Continuation of the search for new means of plant protection and growth stimulators is described. State tests of some herbicides and growth stimulators are discussed briefly. Emphasis on studies related to realization of the Food Program is discussed.

2791/13046

CSO: 1841/486

EXPERIMENTAL STUDIES ON PLASMA PYROLYSIS OF BROWN COAL

Moscow KHIMIYA VYSOKIKH ENERGIY in Russian Vol 20, No 1, Jan 86
(manuscript received 13 Aug 84) pp 61-67

[Article by Z.B. Sakipov, V.Ye. Messerle, Sh.Sh. Ibrayev, V.P. Ryabinin, T.M. Seytimov and B.O. Tobayakov, Kazakh Scientific Research Institute of Energetics]

[Abstract] Plasma oxidation pyrolysis appears to be one of the more efficient methods for the use of low-quality brown coal for the production of synthesis gas, a process of particular interest in view of the anticipated increased use of such coal as fuel in the USSR. A 0.1 MW electric-arc pilot installation has been constructed for the processing of brown coal from the Turgay basin, designed with monitoring and control devices for process assessment. Evaluation of brown coal pyrolysis in the presence of water vapor over a temperature range of 2650 to 3200 K yielded data indicating that the degree of gasification varied from 68.9 to 85.6% for the organic matter, with sulfur gasification reaching 65.0 to 82.9%. The gas phase consisted largely of synthesis gas (87-89%), with a wide latitude in the CO:H₂ ratio (0.75 to 2.3). X-ray analysis of the tailings demonstrated the presence of SiC, FeSi, and Fe₅Si₃, compounds that could be utilized as energy-accumulating substances. Figures 3; references 11: 10 Russian, 1 Western.

12172/13046
CSO: 1841/446

MECHANISM OF NONTHERMAL AUTOACTIVATION OF INTERACTION OF SOLID REAGENT MIXTURES IN COMBUSTION WAVE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 286, No 5, Feb 86
(manuscript received 5 Oct 84) pp 1155-1159

[Article by V.N. Doronin, V.I. Itin and V.V. Barelko, Division of the Institute of Chemical Physics, USSR Academy of Sciences, Chernogolovka, Moscow Oblast]

[Abstract] Experimental data, obtained in a study of features of some reactions of phase formation in metal powder mixtures, are used to develop some ideas about a new mechanism, "autohomogenization" in which the diffusion factor is not the dominant factor. Ti-Ni, Ti-Co, Ti-Al, and Ni-Al powder systems were studied. The reactions proceed in a chain of mutually connected stages reinforcing one another: a liquid phase ruptures particles of the refractory component and creates a developed network of freshly-forming surfaces with high chemical activity. The reaction developing heterogeneically on these surfaces is accompanied by a liquid eutectic phase along the conversion front and this, in turn, stimulates and accelerates interaction in adjacent layers of the sample. This mechanism of intensification of solid-phase conversion due to autodispersion of the refractory agent is not limited to the class of reactions involving formation of intermetallides but may provide the basis for other systems with different melting points of the components. Figures 1; references 14 (Russian).

2791/13046
CSO: 1841/489

TESTING OF 'SOLAR PHOTOELECTRIC STATION--STORAGE BATTERY--SOLAR STAND' SYSTEM

Tashkent GELIOTEKHNICA in Russian No 6, Nov-Dec 85 (manuscript received 7 Feb 84) pp 11-14

[Article by B.A. Bazarov, V.N. Kopysov, S.O. Mamedova, A. Khamadov and S. Soyunmamedov, Ashkhabad]

[Abstract] The load-bearing frame for the test structure was designed for rapid assembly by unskilled workers. The storage batteries were ten hermetically-sealed alkali cells joined in parallel. They were chosen for their ability to handle large currents and brief discharge and for their resistance to breakdown. The system was largely tested in a buffered regime, with a parallel electrical source. Although noncloudy days were generally used, there were still significant variations in solar radiation due to changes in atmospheric clarity. Nevertheless, voltage variations for the system were small for the time period from 0900 to 1730 hours. Solar and wind measurements were taken at 30-minute intervals, along with electrical measurements on the system; discharge current and battery voltages were continuously controlled. During the course of a day, the curves of maximum power and short-circuit current generally followed the curve of solar radiation intensity. However, from 1200-1400 hours, these values rose despite a small drop in the radiation level, probably due to the fact that at that time of the day the solar radiation was almost perpendicular to the nonmovable photoconverters. A system with a parallel wind-energy electrical station was also tested. Wind speed was continuously varying, with some individual changes from 1.5 to 8 m/s noted within the course of a single minute. This made operation of the wind station nearly impossible, even though sustained average wind speeds above 4 m/s were noted. Figures 3; references 9 (Russian).

12672/13046
CSO: 1841/516

PRINCIPLE OF FORMATION OF CELL DIMENSIONS IN POROUS ALUMINUM OXIDE

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 30, No 3, Mar 86
(manuscript received 14 Nov 84) pp 243-246

[Article by V.A. Sokol, Minsk Radiotechnical Institute]

[Abstract] Investigation of the formation of porous anodized surfaces on aluminum indicated that the ratio of cell diameter to pore diameter is independent of the conditions of anodizing and of the parameters of the electrolyte. Aluminum films 1-5 μm thick were deposited on a tantalum film 100-150 nm thick on a dielectric substrate. From this, individual samples having a 1 cm^2 open aluminum area were formed. Porous anodization took place in a galvanostatic regime with automatic recording of the voltage change during growth of the oxide layer in sulfuric, oxalic, and phosphoric acids. Anodizing was carried out at room temperature, and the thickness of the oxide layer, the composition, concentration, and pH of the electrolyte and the electrical parameters were all varied. The kinetic curves of voltage change had an initial sharp rise, followed by a slight drop and then a steady-state condition. This was followed by a sharp peak indicating total oxidation of the aluminum and the beginning of the oxidation of the tantalum sublayer. A table showing the voltages and times for various electrolytes and current densities indicates that the time of oxidation of equal films depends almost totally on the current density. Under these experimental conditions, the total amount of electricity expended for a given mass of metal oxidized was constant. This formed the basis for calculations showing that the ratio of pore diameter to anodizing current must be a constant. Geometric considerations then indicated that it is equal to 3.0 ± 0.2 . This agrees with electron microscope observations. Figures 1; references 5: 2 Russian, 3 Western.

12672/13046
CSO: 1841/504

EFFECT OF IONS OF SURFACE-ACTIVE ORGANIC SUBSTANCES ON KINETICS OF ELECTRO-CHEMICAL REDUCTION OF IONS AND NEUTRAL MOLECULES LIKE-CHARGED DEPOLARIZER AND ADSORBATE IONS

Moscow ELEK'TROKHIMIYA in Russian Vol 22, No 2, Feb 86 (manuscript received 7 Feb 84) pp 170-174

[Article by B.N. Afanasyev and I.A. Cherepkova, Leningrad Technologic Institute imeni Lensovet]

[Abstract] Model calculations were used to study the dependence of the degree of inhibition of the electrochemical reaction on the degree of coating of an electrode surface by ions of an organic substance. Calculated results

were compared with experimental data found in the literature. Free energy of repulsive interaction between the depolarizer and adsorbate depends nonlinearly on the degree of filling of the surface electrode and increases abruptly when the degree of filling is greater than 0.6. Maximum repulsion between ions of the adsorbate and those of the depolarizer occur when the distance from the electrode surface to the center of the discharging ion equals the distance from the electrode surface to the center of the charge in the adsorbate ion. Values of free energy during adsorption of organic ions and combined adsorption of ions and neutral molecules are determined and described. Figures 3; references 15 (Russian).

2791/13046
CSO: 1841/493

UDC 541.135.5:547

EFFECT OF PYROLYSIS TEMPERATURE OF NONMETAL AND COBALT DIBENZOTETRAAZAANNULENES DEPOSITED ON CARBON ON ELECTROCHEMICAL CHARACTERISTICS OF AIR ELECTRODES IN ACID AND ALKALINE ELECTROLYTES

Moscow ELEKTROKHIMIYA in Russian Vol 22, No 2, Feb 86 (manuscript received 11 Apr 84) pp 254-257

[Article by V.S. Gamburtsev, A. Kaisheva, I. Iliyev, G. Grünig and K. Wiesener, Central Laboratory of Electrochemical Power Sources, Bulgarian Academy of Sciences, Sofia, Technical University, Dresden]

[Abstract] The effect of the temperature of pyrolysis of H_2DTAA and $CoDTAA$ on electrochemical characteristics of carbon air (oxygen) electrodes in an alkaline electrolyte was compared to that occurring in an acid electrolyte. Plotting the dependences of electrochemical activity $j_{950}^{O_2}$ and $j_{800}^{O_2}$ of oxygen electrodes in 7N KOH, on temperature of pyrolysis of H_2DTAA and $CoDTAA$, shows that they pass through peaks. Comparison of these dependences with those obtained in 4.5 N H_2SO_4 shows that approximately the same shift of peaks toward lower pyrolysis temperature occurs for catalysts with $CoDTAA$. The course of dependences of the electrode potentials difference in oxygen and air on current density differs considerably in 4.5 N H_2SO_4 and 7 N KOH for electrodes containing pyrolyzed H_2DTAA and those containing pyrolyzed $CoDTAA$. The dependence of transport difficulties on pyrolysis temperature on carbon differs significantly from that for $CoDTAA$. In this case, transport difficulties are reduced with increase of pyrolysis temperature in the entire temperature range studied. The increased activity of the catalysts in both 7 N KOH and in 4.5 N H_2SO_4 is caused by products of pyrolysis of an organic macroring. The presence of cobalt decreases transport difficulties, especially in 7 N KOH. Figures 3; references 7: 3 Russian, 4 Western.

2791/13046
CSO: 1841/493

EFFECT OF CHLORIDE ADDITIONS TO EUTECTIC MELT LiF-NaF-KF ON ANODIC PROCESS ON VITREOUS CARBON

Moscow ELEKTROKHIMIYA in Russian Vol 22, No 2, Feb 86 (manuscript received 20 Sep 84) pp 267-270

[Article by V.N. Nekrasov, V.B. Cherepanov and L.Ye. Ivanovskiy, Institute of Electrochemistry, Ural Scientific Center, USSR Academy of Sciences, Sverdlovsk]

[Abstract] A study of the effect of small (up to several mole percent) additions of chloride salts, introduced in the form of KCl or PbCl₂, employed the use of a system of eutectic melts of lithium fluoride, sodium fluoride, and potassium fluoride (46.5-11.5-42.0 mole percent). Liberation of significant amounts of chlorine and freons because of kinetic difficulties, caused by passivation of the electrode surface, proceeds with a significant surge with the percent of fluorine in the gas increasing with an increase of magnitude of the surge. Two types of passivation noted include weak passivation of a chemisorption type, when η is lower than 2V and stronger passivation at higher polarizations with formation of compounds which are practically nonconductors of electricity, with a covalent bond. This is confirmed by nonstationary galvanostatic measurements. Figures 4; references 3: 2 Russian, 1 Western.

2791/13046

CSO: 1841/493

FERTILIZERS

UDC 631.81:656.078

USE OF NATURAL ZEOLITES TO PREVENT CAKING OF MINERAL FERTILIZERS

Tbilisi SOOBShCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 120, No 3, Dec 85 (manuscript received 16 Mar 84) pp 537-540

[Article by G.V. Tsitsishvili, academician GSSR Academy of Sciences, K.G. Meladze, G.V. Maysuradze, T.V. Sharashenidze and G.L. Kareli, GSSR Academy of Sciences, Institute of Physical and Organic Chemistry imeni P.G. Melikishvili]

[Abstract] Laboratory studies of the prospects of using powdered natural zeolite (clinoptilolite) to reduce caking of ammonium nitrate are described and discussed. Zeolite from the Dzegi deposit (Khekordzula area) was used on fertilizers produced by the Rustavi Production Association "Azot." Samples treated by zeolite and pure niters were placed in open glass vessels and were checked after 1, 3, and 6 months of storage for moisture content, strength, and granulometric composition. Granules of both batches were practically dry and could be poured readily after storage for 1 month. After storage for 3 months, untreated granules were moistened, had lost strength, and were deformed. After storage for 6 months, the moisture content in the untreated ammonium nitrate increased, the salt was damp, and conglomerates formed throughout. Tapping did not loosen the granules. Any conglomerates forming in the zeolite-treated samples were readily loosened by tapping. Use of zeolite was more effective when samples were kept at +5°C and constant air humidity during the experiments. The studies showed that the use of zeolite reduces ammonium nitrate caking and makes it possible to ship it in open containers and to store it in open air. Figures 1; references 4 (Russian).

2791/13046

CSO: 1841/482

ROLE OF FILM-FORMING COMPOSITES IN PROTECTION OF DAMAGED CORN SEEDS

Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 1, Jan-Feb 86 pp 43-45

[Article by A.I. Kalyuzhnyy, Ye.L. Litvinenko, candidates of agricultural sciences, and A.M. Grechanyuk, junior scientist, "Dnepr" Corn Scientific Production Association (NPO)]

[Abstract] Increased mechanization of agriculture has resulted in considerable losses due to mechanical damage to seeds, with the result that several film-forming agents were tried as a protective device in the preplanting period. Studies with several corn varieties (Pioneer 3978, Krasnodar 303 TV, Dnepr 758 TV) demonstrated that enclosure of the seeds in polyvinyl alcohol film led to improved harvests when at least 20-30% of the seeds had sustained mechanical damage. When the level of damage was in the 5-10% range, the protective effects of coating were not readily apparent. The efficacy of such seed pretreatment was considerably enhanced if Zn, Mo, and Mn were incorporated into the films, raising the corn harvests to 4.9 centners/ha in some cases. In addition to the protective measures which include coating the seeds with protective films, supplemented with trace elements and growth-promoting substances, a standard should also be set to govern allowable limits of seed damage by processing machines.

12172/13046
CSO: 1841/415

INCRUSTATION OF MILLET SEEDS

Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 1, Jan-Feb 86 pp 45-47

[Article by I.V. Yashovskiy, doctor of agricultural sciences, and L.I. Perevertun, Ukrainian Scientific Research Institute of Agriculture]

[Abstract] Polyvinyl acetate films were tried as protective agents for mechanically-damaged millet seeds, in an attempt to meet the challenge of increasing mechanization in agriculture and yet minimize losses due to such unavoidable damage. In general, field trials in 1983 demonstrated that preplanting protection of seeds--damaged and undamaged--with a polyvinyl acetate film from a 10% suspension results in a ca. 10% increase in germination. The results were attributed to both protection from disease-causing agents and environmental conditions. Best results in terms of harvest were obtained by treating the seeds with a combination of 10% polyvinyl acetate suspension and 0.025-0.050% succinic acid or $(1-6) \times 10^{-6}\%$ nortiol, the latter two growth stimulants, reaching figures of ca. 34-36 centners/ha. Additional incorporation of fundazole into the films completely prevented smut development. Thus, coating seeds with such protective films has been demonstrated to be an effective method for maintaining and improving millet harvests.

12172/13046
CSO: 1841/415

MIXED LIQUID FERTILIZERS SUPPLEMENTED WITH TRACE ELEMENTS

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 3, Mar 86 pp 17-19

[Article by V.A. Zarubina, L.M. Solovyeva, S.M. Yershova, N.N. Malakhova and N.G. Shmykova, Voskresensk Branch, Scientific Research Institute for Fertilizers and Insectofungicides]

[Abstract] Studies were conducted on the conditions leading to the production of stable 10-34-0 liquid fertilizers supplemented with trace elements. Analysis of the solubility patterns of Zn, Cu, Mo, B, and Co salts in relation to temperature indicated that chemical reaction of the trace elements with the components of the liquid fertilizers resulted in the formation of complex polyphosphate compounds represented by $[\text{TE}]\text{NH}_4\text{P}_2\text{O}_7$ and $[\text{TE}]\text{NH}_4[\text{PO}_4]_8 \cdot 4\text{H}_2\text{O}$, where TE = trace element cation. The viscosity of the solutions was markedly increased by the addition of the trace elements, while such factors as pH, density, and freezing point were affected little. Stabilization of the liquid fertilizers with 1-4% carbamide increased the stability of the liquid fertilizer from 1.5-2 months to 6 months, and allowed for full solubility of the trace element salts in 10 min at 40°C. Figures 1.

12172/13046

CSO: 1841/517

UDC 631.815

DEFINING LIQUID FERTILIZER COSTS

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 3, Mar 86 pp 20-22

[Article by V.M. Koldayev, All-RSFSR Scientific Research and Planning Technological Institute for Agricultural Chemization]

[Abstract] An analysis was conducted for the different economic regions of the RSFSR on the cost of using solid and liquid mineral fertilizers, with the resultant data summarized in tabular form for liquid ammonia and complex liquid fertilizers. The cost data, which were collected over a 3-year period (1982-1984), can serve as a foundation for evaluating the cost effectiveness of the liquid fertilizers in relation to crop value, labor cost, and cost of the Selkhozkhimiya mechanized brigades. The intent is to provide cost factors based on regional differentiation rather than on an average basis for the entire RSFSR without consideration for specific local conditions.

12172/13046

CSO: 1841/517

MINERAL FERTILIZER SUSPENSIONS

Moscow KHIMIYA V SELSKOM KHOZYAYSTVE in Russian No 3, Mar 86 pp 31-32

[Article by A.M. Artyushin, P.Kh. Briyedis, A.Ya. Birgelis, V.I. Viltans and A.E. Shmits]

[Abstract] Latvia is the first republic in the USSR to have made the decision to rely virtually exclusively on liquid fertilizers in the future, with preliminary field trials showing that using a suspension of 10-34-0 fertilizers yielded winter wheat harvests within the range of 70-88 centners/ha. Optimal methods for the preparation of such suspensions, which contain a high (40-50%) concentration of the solid components, includes the use of 2-5% phosphogypsum for stabilization, as well as supplementation with carbamide to provide additional nitrogen. The simple technology with which the desired suspensions can be produced has led to the recommendation that such fertilizers be used extensively in agriculture. References 5 (Russian).

12172/13046
CSO: 1841/517

UDC 622.78:[661.635.41+661.635.42]

FUSED CALCIUM-MAGNESIUM PHOSPHATE, COMPLEX PHOSPHORUS-MAGNESIUM FERTILIZER

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 86 pp 87-89

[Article by N.N. Derbunovich, Yu.V. Ryabov, B.V. Drachev and V.P. Seregin]

[Abstract] In connection with the shortages of sulfur in some countries and excess supplies in others, the nonacidic method of the production of fused calcium-magnesium phosphates (FCMP) is of interest to most specialists working in this area. The process itself is an old one; it includes the following steps: fractionation of phosphate ore and magnesium silicates, fusion in electric ovens, tempering and granulation of the material, drying, and milling. A number of technological aspects was discussed reviewing approaches in different countries to the problem of FCMP production. FCMP are quite brittle and can be easily milled to desired size; they are easily soluble in citric acid. Anything leading to decreased solubility in citric acid will decrease the effectiveness of phosphate-magnesium fertilizers. FCMP is practically insoluble in water and is not alkaline; even after 3-year storage the material is dry. The leading producer of FCMP is Japan. Its utilization in tropical areas is especially advantageous. References 10: 2 Russian, 8 Western.

7813/13046
CSO: 1841/494

EFFECTIVENESS OF CHEMIZATION

Moscow KHIMIYA I ZHIZN in Russian No 2, Feb 86 pp 3-6

[Article by V. Stantso]

[Abstract] In light of the wide-ranging plans announced by the Politburo CC CPSU for chemization of USSR agriculture in the period of 1986-2000, an interview was held with A.G. Petrishchev, minister for production of mineral fertilizers. Recounting achievements of the last 5 years, the minister noted, first of all, creation of the Ministry. Furthermore, comparing the year 1985 to 1980, production of mineral fertilizers increased by 8 million tons: nitrogen type by 3.7 million, phosphorus by 2.2 million, and potassium fertilizers by 2.3 million tons. Production of chemical plant protective agents increased by 45.5 thousand tons. Along with these gains, various resources and energy were saved. Total volume of industrial production was increased, and average annual growth rate was maintained at 7%. For the last decades of this century, production of mineral fertilizers should increase to 41-43 million tons and chemical plant protecting agents to 440-480 thousand tons. Thanks to the introduction of chemistry into agriculture, during the period of 1940-1980 it was converted into an industrial base. However, the application of these chemicals is not too effective because weeds thrive on them as well. Lack of proper machinery for application of fertilizers loses about 15% of the available resources, however. In transfer from the plant to the field, about 4-5 million tons of fertilizers are lost annually. Indiscriminate use of them adds to the waste. Improvements in the fertilizers themselves are needed: only 35-55% of them are utilized by plants, the rest is lost. Finally, plans have been made to increase the assortment and volume of retail supply of fertilizers and weed killers to provide these chemicals to individual small-scale fruit and vegetable growers.

7813/13046

CSO: 1841/445

CRYSTALLIZATION OF OXIDE LAYER DURING HEAT TREATMENT OF ALUMINUM POWDER

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 30, No 3, Mar 86
(manuscript received 5 Apr 85) pp 240-242

[Article by P.A. Vityaz, V.K. Sheleg, V.N. Ananin, G.P. Pimenova,
V.Ye. Romanenkov, N.P. Glukhova, V.I. Ovchinnikov and T.A. Smirnova,
Institute of Physico-Organic Chemistry, BSSR Academy of Sciences,
Belorussian Republic Scientific Production Association of Powder Metallurgy]

[Abstract] The oxide layer on aluminum powder was changed by heat treatment in a vacuum, in a stream of nitrogen containing 190 mg/m^3 of water vapor, and in air. Aluminum powder with spherical particles was examined in two fractions: 10-30 and 200-315 μm with the structure and phase composition of the oxide layer determined by transmission electron microscopy. Heat effects accompanying the structural changes were measured with a derivatograph. Prior to examination, the metallic cores of the particles were dissolved, leaving hollow oxide shells. For the smaller particles, a homogeneous layer was predominantly amorphous, although some crystalline nuclei were apparently present. On the larger particles, a heterogeneous layer contained crystallites of $\gamma\text{-Al}_2\text{O}_3$. Under heat treatment of the small particles in all three media, the oxide formed crystallites of the γ -phase. This was accompanied by a shrinking of the oxide surface and a partial uncovering of the metal. Figures 2; references 7 (Russian).

12672/13046
CSO: 1841/504

PROPERTIES AND MECHANISM OF PHOTOCONDUCTIVITY OF POLYCRYSTALLINE LEAD SULFIDE LAYERS

Moscow POVERKHNOST: FIZIKA, KHIMIYA, MEKHANIKA in Russian No 2, Feb 86
(manuscript received 5 Jul 85) pp 117-126

[Article by A.N. Kovalev and F.I. Manyakhin, Moscow Institute of Steel and Alloys]

[Abstract] A model was developed for the photoconductivity layers of lead sulfide grown by vacuum evaporation of various materials. The film contains a longitudinal p-n transition. In contrast to sandwich or multilayer structures, both layers participate in this model, the upper p-layer determining the dark conductivity. Potential contour of these layers is different: drift barriers exist in p-layer on the path of current flow while in the n-layer both drift and recombination barriers are found on crystal edges. Acceptor levels E_s form the potential contour on film surface and at crystal edges, while the recombination of charge carrier occurs through E_{sr} on the surface. Neutralization of E_s results in the loss of photosensitivity. Principal photocarriers at the temperature range 300-140 K are holes and at 120-80 K they are electrons. Sublinearity of volt-ampere characteristics is determined by field effect in surface p-layers. This model describes adequately properties of "physical" PbS layers obtained by vacuum deposition. Chemical layers have no p-layers and their photoconductivity mechanism is different. Figures 6; references 20: 18 Russian, 2 Western.

7813/13046
CSO: 1841/455

INTENSIFICATION OF ION EXCHANGE TECHNOLOGICAL PROCESSES

Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 86 pp 108-110

[Article by L.M. Zhuravleva, A.M. Chemerisova, N.N. Smirnov and N.P. Figurovskaya]

[Abstract] One of the most promising processes involved in economic utilization of starting materials is ion exchange process. Synthetic ion exchange resins find application in many industrial branches: water desalination is one of the original applications in ion exchange technology. It found practical application also in closed circuit water supply systems; other applications are in the field of atomic energy, medicine, chemical technology, analytical chemistry, catalysis, etc. Ion exchange is a multiple-stage process taking place in the solid phase-liquid system. The rate of ion exchange is influenced by diffusion rate, chemical reactivity, side reactions, etc. Temperature is one of the strongest factors affecting ion exchange processes followed by the grain size of the ion exchange resin, its structure, ion mobility, chemical reactivity, etc. Ion exchange resins were synthesized with high permeability to maximize their exchange potential. Fibrous ion exchangers show excellent kinetic properties because of their surface activity. Further development in ion exchange technology will depend on development of new materials with improved properties and on new equipment. References 16 (Russian).

7813/13046

CSO: 1841/494

BOROTETRAZINES. PART 4. SYNTHESIS OF BORON-CONTAINING COMPLEXES BASED ON HYDROXYL-SUBSTITUTED TRIARYLFORMAZANES

Moscow ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 2, Feb 86
(manuscript received 10 Jun 85) pp 390-392

[Article by B.I. Stepanov, G.V. Avramenko, Salekh Khamud and
Sh.I. Mustafayeva, Moscow Chemical Technologic Institute imeni
D.I. Mendeleev]

[Abstract] This article describes the formation of boron complexes with 1,3-diphenyl-5-(2-hydroxyphenyl)formazane and three similar compounds, one with a 4-hydroxyphenyl group on the position-5 nitrogen, and the other two with one or the other of the hydroxyphenyl groups on the carbon atom. The complexes were formed by boiling the formazanes in acetic anhydride with 3-4 times excess of boric acid. Analysis by mass spectroscopy, paramagnetic resonance spectroscopy, and infrared spectroscopy indicated that the last three compounds all formed complexes having a boron atom with two acetoxy groups coordinately linked to both the number 3 and 5 nitrogens and the original hydroxy groups acetylated to acetoxy groups. In the case of the N-5-(2-hydroxyphenyl) compound, the complex had a boron with one acetoxy group directly bonded in place of the hydrogen to the oxygen of the hydroxyphenyl group and also coordinately linked to the two end nitrogens. Detailed synthesis procedures are given for the formazanes and the boron complexes. References 4: 3 Russian, 1 Western.

12672/13046
CSO: 1841/497

INTERACTION OF NITROLIGNIN AND AMMONIA

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 6, Nov-Dec 85
(manuscript received 25 Feb 85) pp 827-829

[Article by T.S. Kaplunova, Z.K. Saipov and Kh.A. Abduazimov, Order of Labor Red Banner Institute of Chemistry of Plant Substances, UzSSR Academy of Sciences, Tashkent]

[Abstract] A study of the reaction of nitrolignin and aqueous ammonia confirmed the fact that lignin reacts with ammonia at room temperature because of carbonyl and carboxylic groups of the lignin, forming imines and ammonia salts. Optimal conditions of reaction, found by varying reagent ratios, temperature, and reaction time were: nitrolignin/ammonia ratio 4:1, reaction time 15 minutes and temperature 25-30°C. The violent reaction liberates heat and produces a dark brown powder which is completely soluble in water. It has a high N content. A semiempirical formula for the compound was calculated and discussed. Molecular weight of the preparation determined by sedimentation on an ultracentrifuge, is approximately 70,000. It is a polydispersed compound.

2791/13046
CSO: 1841/483

CHEMICALLY REACTIVE PARTICLES IN HYDRAZINE-PRODUCING REACTIONS IN PLASMA

Moscow KHIMIYA VYSOKIKH ENERGIY in Russian Vol 20, No 1, Jan 86
(manuscript received 7 Jun 84) pp 72-75

[Article by Ye.L. Gorn, P.A. Zagorets, V.V. Koval, V.G. Kutsayev and V.A. Petrishchev, Moscow Institute of Chemical Technology imeni D.I. Mendeleev; State Scientific Research Design and Construction Institute of the Nitrogen Industry and Organic Synthesis]

[Abstract] Kinetic studies were conducted on the formation of hydrazine from nitrogen and hydrogen, using nitrogen afterglow from 20 to 70 mA current discharges under a pressure of 1.9 kPa. The reactions were found to involve parallel processes of relaxation of active nitrogen and its chemical reaction with hydrogen, with the nitrogen afterglow containing three active particles. The latter were represented by nitrogen atoms, $N(^4S)$, electronically excited nitrogen molecules, $N_2(A^3\Sigma_u^+)$, and nitrogen molecules with vibronic excitation, N_2^v . Introduction of a titanium oxide insert into the afterglow zone reduced the concentration of the former two species without significantly affecting the concentration of N_2^v and the yield of hydrazine, supporting the kinetically-derived view that the N_2^v molecules initiate the primary chemical interaction leading to hydrazine formation. Figures 3; references 12: 11 Russian, 1 Western.

12172/13046
CSO: 1841/446

THERMAL DECOMPOSITION OF TRIMETHYL- AND TRIETHYLARSINE IN GAS PHASE

Moscow ZHURNAL OBSHCHEY KHIMII in Russian Vol 56, No 2, Feb 86
(manuscript received 2 Jul 85) pp 365-367

[Article by V.A. Yablokov, I.A. Zelyayev, Ye.I. Makarov, Yu.F. Gatilov,
V.A. Gonina and A.D. Zorin, Gorkiy Engineering Construction Institute
imeni V.P. Chkalov]

[Abstract] The article describes the kinetics of thermal decomposition of Et_3As and Me_3As under static conditions in the temperature ranges 369-420 and 414-463°C and with initial pressures of 85-90 and 145-150 mm Hg, respectively. The kinetics can be described by a first-order equation up to 80-90% completion. Tables of the reaction constants are given, along with formulas for the dependence of the constants on temperature. Changes of 1.8-2.5 times in the initial pressures or of 5-25 times in the surface of the reactor did not have any significant influence on the values of the constants. The reaction produced a metallic film on the walls of the reactor; the basic gaseous decomposition products were saturated hydrocarbons, with little change in composition over the temperature ranges investigated. Energy of activation of the decomposition reactions was found to be 50.4 and 57.3 kcal/mol, respectively, practically identical to the energy of dissociation of the corresponding alkyl-arsenic bonds. References 7: 5 Russian, 2 Western.

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PESTICIDES

UDC 628:66.093.632.95

KINETICS OF APHOS HYDROLYSIS IN AN AQUEOUS MEDIUM

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian Vol 8, No 1, Jan-Feb 86
(manuscript received 2 Apr 84) pp 22-24

[Article by M.A. Klisenko, D.B. Girenko and Z.A. Leyka, All-Union Scientific Research Institute of Hygiene, Toxicology, Pesticides, Polymers and Plastics, Kiev]

[Abstract] The kinetics of aphos hydrolysis were studied in aqueous media at different pH values using $1.2 \cdot 10^{-2}$ micromole of a chemically pure aphos solution with desired pH (1-11) created by use of a general purpose phosphate buffer. A diagram of hydrolytic decomposition, constructed on the basis of data obtained, corresponds to that of the general mechanism of decomposition of phosphonates. Aphos persists for as long as 600 hours in acid solutions but is not detected 3 minutes after introduction into solutions with pH > 9. Hydroxyphosphonate, possibly formed by rupture of the C-O bond, and acetic acid are products of decomposition in an acid medium. Increase of pH up to 5 changes the mechanism of aphos decomposition reaction with formation of dehydrochlorinated aphos and hydroxyphosphonate. Aphos decomposition produces products which are more toxic than the starting compound. Figures 3; references 4 (Russian).

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CSO: 1841/499

UDC 628.3:632.95

DECONTAMINATION OF AQUEOUS SOLUTIONS OF PESTICIDES BY PHOTOLYSIS

Kiev KHIMIYA I TEKHNLOGIYA VODY in Russian, Vol 8, No 1, Jan-Feb 86
(manuscript received 17 May 83; in final form 12 Mar 85) pp 76-78

[Article by A.V. Grechko, N.I. Martsenyuk and V.I. Tsipriyan, Institute of Colloid Chemistry and Water Chemistry imeni A.V. Dumanskiy, UkSSR Academy of Sciences, Kiev]

[Abstract] An attempt to justify the use of photolysis to remove pesticides from water used hexachlorocyclohexane, celtane, acrex, and caratane as objects

of study. The kinetics of the photolysis process and the organoleptic and toxic properties of the water after treatment were studied. A 3.5-4.0 cm layer of water containing a fixed quantity of pesticide was placed in a tray 15 cm from an ultraviolet radiation source (365-366 nm). The period of pesticide half-life ranged from 14 minutes (for hexachlorocyclohexane) to 35 minutes (for caratane). Organoleptic properties of the water improved as a result of absence of the pesticides in the treated water, significant decrease of turbidity, and absence of odor. Toxicity of the water decreased. No differences in indicators were found in animals drinking this water and in those drinking tap water. References 8 (Russian).

2791/13046
CSO: 1841/499

UDC 632.95.025.153

SENSITIVITY OF ACETYLCHOLINESTERASE OF APHIDS AND CHRYSOPS TO SOME INHIBITORS AND INSECTICIDES

Moscow AGROKHIMIYA in Russian No 2, Feb 86 (manuscript received 5 Mar 85)
pp 99-103

[Article by K.V. Novozhilov, Ye.V. Nikanorova, I.N. Sazonova, Ye.Ya. Shuakhina, A.P. Brestkin and Ye.B. Mayzel, All-Union Scientific Research Institute of Plant Protection; Institute of Evolutionary Physiology and Biochemistry, USSR Academy of Sciences, Leningrad]

[Abstract] Sensitivity of acetylcholinesterases of aphids and their entomophages, ordinary chrysop and Chinese chrysop, to organophosphorus and carbamate compounds was studied and discussed. Chrysops were grown in special chambers on grain moth eggs. Homogenate of whole insects served as a source of acetylcholinesterase. Acetylcholinesterase activity of chrysops (larvae and imago) and aphids was determined by the Ellman et al. method by the rate of hydrolysis of acetylcholine-iodine in 0.2 M sodium-phosphate buffer, at pH 7.0 and 25°C. Acetylcholinesterases of the species studied displayed different degrees of sensitivity to the inhibitors and insecticides studied. Acetylcholinesterase of aphids was more sensitive to typical organophosphorus inhibitors and the insecticides khostakvik and pirimor and acetylcholinesterases of chrysops were more sensitive to eserine. The insecticides studied were also highly toxic for aphids. Pirimor was assumed to be a selective aphicide but khostakvik has limited selective properties. The studies indicated that the selectivity of acetylcholinesterase activity of the pesticides has decisive importance in their selective toxicity. References 16: 15 Russian, 1 Western.

2791/13046
CSO: 1841/488

CURRENT TRENDS IN DEVELOPMENT OF NEW PESTICIDES

Moscow AGROKIMIYA in Russian No 2, Feb 86, pp 119-129

[Article by N.M. Melnikov]

[Abstract] A survey of the literature is used to discuss aspects of the search for new pesticides. This search involves study of pesticidal properties of substances of biological origin, thorough screening of specially synthesized compounds as applied to intermediates existing in a given country, modeling natural compounds, analog synthesis with consideration of known active substances, study of metabolism and mechanism of action of different classes of organic compounds, and study of the effect of different classes of organic compounds on pests. Each of these approaches is described and discussed briefly, and the advantages of the continuous screening method are presented. The impact of use of computer techniques in the search for new pesticides is discussed. Soviet research involving synthesis of analogs of a juvenile hormone controlling insect metamorphosis is discussed briefly. One such hormone is used in mosquito control. Soviet investigators have studied benzoxazolinone derivatives for use as fungicides. A model in this case is methoxybenzoxazolinone. More and more attention is being given to a method based on study of the metabolism and conversion of different classes of chemical compounds under the effect of different enzymes. Some Soviet scientists have been successful in studying organophosphorus compounds by such a method and have found an approach to synthesis of new organophosphorus insecticides based on their conversion under the effect of various enzymes. Differences in effectiveness of methylcarbamic acids are discussed in terms of their metabolic pathways in mammals and arthropods. The metabolic pathways of carbosulfane in flies and rats are discussed briefly. References 40: 14 Russian, 26 Western.

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CSO: 1841/488

UDC 547.729.7+543.51

SYNERGISTS OF INSECTICIDES. PART 10: CHLOROMETHYLATION OF SAFROLE

Leningrad ZHURNAL ORGANICHESKOY KHIMII in Russian Vol 22, No 2, Feb 86
(manuscript received 20 Nov 84) pp 384-387

[Article by B.B. Lurik and Yu.P. Volkov, All-Union Scientific Research
Institute of Disinfection and Sterilization, Moscow]

[Abstract] Possible directions of chloromethylation in the 1,2-methylenedioxybenzene series were investigated by detailed studies of products of this reaction with use of 1-allyl-3,4-methylenedioxybenzene (safrole) as a model substance and use of gas liquid chromatography. The reaction yielded

6-(chloromethyl) safrole as the basic product and di(3,3-methylene-dioxy-6-allylphenyl)methane, di(3,4-methylenedioxy-6-allylbenzyl)ether and 6-hydroxymethyl)safrole. Structure of the compounds was determined by use of mass spectroscopy. References 7: 6 Russian, 1 Western.

2791/13046

CSO: 1841/481

UDC 622.764.3+660.934.7+660.941.4

NEW ENERGY-SAVING METHOD FOR PREPARATION OF NATURAL GAS

Kiev NEFTYANAYA I GAZOVAYA PROMYSHLENNOST in Russian No 1, Jan-Mar 86 pp 37-39

[Article by Ye.I. Naumov, R.F. Lavrentovich and N.A. Kochergin, Kiev Branch of All-Union Scientific Research Institute of ST (unknown abbreviation; fuel pipeline?)]

[Abstract] To remove condensate from natural gas before its transportation, usually low temperature separation is used on a large scale. This is not a very efficient method. A new approach was developed and tested at the Institute based on thermocatalytic preparation of natural gas in which methane homologs are converted to methane. This is an adiabatic process performed at 300-450°C and 3-10 atm pressure in presence of steam, over nickel containing catalyst. This processing gave increased yield of the final product and reduced the production costs. Equipment-wise, this process is not complicated and has many advantages over the old method. References 3 (Russian).

7813/13046
CSO: 1841/463

UDC 543.272:546.291

ISOLATION OF HELIUM FROM GASES BY MEANS OF ALIPHATIC POLYAMIDE FIBERS

Kiev NEFTYANAYA I GASOVAYA PROMYSHLENNOST in Russian No 1, Jan-Mar 86 pp 39-40

[Article by R.A. Bagirov, F.A. Mekhtiyeva and G.I. Mukhtarova, All-Union Scientific Applied Institute of Gas]

[Abstract] Deep freezing of natural gases to remove small quantities of helium is not a practical method. Experimental results were reported on isolation of helium from natural gases by means of aliphatic polyamide tubular fibers with internal and external diameters of 20-25 and 48-57 μm , respectively, and a wall thickness of 14-16 μm . Purified dry gas was passed through a tube containing 1500 mm long fibers and removed from the system under 1-1.2 atm pressure. An enrichment of helium from 0.058 to 0.46 vol-% was achieved with a 78% efficiency in removing helium.

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CSO: 1841/463

PRODUCTION OF METHANOL BY INCOMPLETE OXIDATION OF NATURAL GAS

Kiev NEFTYANAYA I GAZOVAYA PROMYSHLENNOST in Russian No 1, Jan-Mar 86 pp 40-41

[Article by P.M. Shcherbakov, S.A. Yegorov and S.F. Bobrova, Ukrainian Scientific Research Institute of Gas]

[Abstract] A plant was constructed at the Shebelinsk experimental segment of the Ukrainian Scientific Research Institute of Gas for production of methanol from natural gas by homogeneous oxidation (without any catalysts) of the gas with air at 400-420°C, 10 atm pressure, and oxygen concentration 2.5-2.8 vol-%. The product is isolated by cooling, concentration, and separation. It is obtained by a single passage through the system yielding 50% methanol, 15-20% oxygenated organic compounds, and 30-35% water. The unreacted gas containing 79-82% methane is pumped away. Investment in construction of plants at the gas pumping sites is recovered in 3-3.5 years. References 5 (Russian).

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UDC 622.693.4

HYDRODYNAMIC MODEL OF SOUNDING APPARATUS FOR MOVEMENT INSIDE PIPELINES

Kiev NEFTYANAYA I GAZOVAYA PROMYSHLENNOST in Russian No 1, Jan-Mar 86 pp 49-51

[Article by V.D. Shiyan, Kiev Branch, All-Union Scientific Research Institute for the Construction of Trunk Pipelines]

[Abstract] The goal of this study was to calculate the energy regimen and construction parameters for intrapipeline diagnostic sounding equipment based on a model. The study was done on an experimental unit considering three different models: cylindrical model with spherical deflector in the front part, cylindrical model with a deflector in the tail part, and a model consisting of seven tubular hermetic cylinders. Experiments performed made it possible to evaluate and calculate the power of electric gear drive of an automatic deflectoscope as a function of construction parameters of the pipeline; it was also possible to determine noise levels in the pipeline junction channel and to calculate the sensitivity of sensors for the acoustic signals. With a signal to noise ratio of three, the calculated value of dissipation signal should be at least 96 dB for a reliable receipt and processing of acoustic signals. It was shown to be possible to isolate clearly the dissipation signals and the background of the interference. Figures 1; references 2 (Russian).

7813/13046
CSO: 1841/463

PYROLYSIS OF HYDROCARBONS IN PLASMA JET OF H_2 IN PRESENCE OF NICKEL VAPORS AND PARTICLES

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in Russian No 1, Jan-Feb 86 (manuscript received 30 June 83) pp 69-72

[Article by Yu.A. Moiseyev, N.A. Gafarova and V.T. Popov, Institute of Chemistry of Petroleum and Natural Salts, KaSSR Academy of Science, Guryev]

[Abstract] Pyrolysis of C_1-C_4 in the presence of nickel vapors and particles, introduced in an H_2 plasma jet, generated by a direct current electric-arc plasmatron, is described and discussed. The effect of nickel is significant. In experiments without addition of nickel in the pyrogas, C_2H_2 ($C_2H_2/C_2H_4 \sim 1.58-3.55$) predominates and in experiments in the presence of nickel in the reaction zone the ratio is ($C_2H_2/C_2H_4 \sim 0.44-0.47$). In experiments with participation of nickel, the quantity of unsaturated hydrocarbons is reduced somewhat, evidently because not only C_2H_2 but also C_2H_4 and C_3H_6 are hydrolyzed in the presence of nickel. References 7: 6 Russian, 1 Western.

2791/13046

CSO: 1841/485

UDC 547.873:665.753.2:542.943

INHIBITING ACTION OF PHENOL DERIVATIVES OF TRIAZINE ON OXIDATION OF JET FUEL

Moscow NEFTEKHIMIYA in Russian Vol 25, No 6, Nov-Dec 85 (manuscript received 5 Jan 84) pp 821-825

[Article by I.A. Golubeva, O.V. Malova, T.P. Vishnyakova, V.I. Kelarev and A.F. Lunin, Moscow Institute of the Petrochemical and Gas Industry imeni I.M. Gubkin]

[Abstract] Derivatives of sym-triazine with up to six sterically hindered phenol fragments were tested as antioxidants with high-temperature stability. Effectiveness was tested at $120^\circ C$ by taking hourly samples for 12 hr and determining optical density, acidity, and peroxide number. They were also tested at $180^\circ C$ by measuring the time required to reach a maximum concentration of hydroperoxides. Antioxidant concentration was 0.003 wt % in T-6 fuel. Effectiveness was compared to a standard concentration of ionol. In the 12-hour test, the triazine derivatives showed significant antioxidative activity, generally much better than ionol. Effectiveness depended upon the number of sterically hindered phenol fragments and the type of group binding them to the triazine ring. The most effective antioxidant was 2,4,6-tris-[bis-(4-hydroxy-3,5-di-tert-butylphenyl)amino]-sym-triazine, with six phenol fragments. Sulfur-containing bonds, such as $-S-CH_2-$, were particularly effective, probably due to the complementary antioxidative effect of sulfur-containing compounds on hydroperoxides. Direct linking to

the ring through an amino group also improved the antioxidative effect. Even when the concentration of the triazine derivatives was halved, they still were more effective than the standard ionol concentration. In the tests at 180°C, the triazine derivatives increased the time needed to reach maximum concentration of hydroperoxides from 5-10 min for ionol (depending on concentration) to 15-50 min, with the compound specified above again giving the best results. Figures 1; references 4 (Russian).

12672/13046
CSO: 1841/399

UDC 665.73.038.5

DIENEOPHILIC COMPOUNDS AS INHIBITORS OF RESIN FORMATION IN FUELS

Moscow NEFTEKHIMIYA in Russian Vol 25, No 6, Nov-Dec 85 (manuscript received 18 Jun 84) pp 826-828

[Article by A.M. Danilov, Ye.L. Talisman and Ye.V. Alekseyeva, Electrogorsk Branch, All-Union Scientific Research Institute of Petroleum Refining]

[Abstract] Destructive refining processes, such as thermal cracking, give products prone to resin formation and so often unsuitable for fuel use. Resin formation appears to be an oxidative polymerization, requiring only trace amounts of oxygen and initiated by dienes present in small quantities. Two gasoline samples which were produced by thermal cracking and subject to intensive oxidation were examined. The addition of 0.01% ionol significantly slowed the uptake of oxygen, but the production of oxidative sedimentary products was only slightly reduced, from 627 to 510 mg/100 ml in one sample. Similar results were obtained with other industrial antioxidants. However, dieneophilic compounds reduced these products by 3-10 times. Maleic anhydride, for example, reduced them to 140 mg/100 ml for the same gasoline sample, but left the induction period practically unchanged. Apparently, the dieneophilic compounds do not react with radicals in the oxidation chain but only influence polymerization processes based on dienes. The most effective concentration of these compounds was low (about 0.01% for maleic anhydride), with higher concentrations tending to increase the amount of resin products. For one gasoline tested, the addition of 0.06% ionol exactly met the standard for 900 min induction time but resulted in 540 mg/100 ml of oxidative products, far above the standard of 100 mg/100 ml. The inclusion of 0.02% dieneophile lowered the oxidative products to 98 mg/100 ml, while barely changing the induction period to 910 min. Figures 2; references 7: 4 Russian, 3 Western.

12672/13046
CSO: 1841/399

SYNTHETIC LIQUID FUEL AND ALCOHOLS

Kiev VESTNIK AKADEMII NAUK UKRAINSKOY SSR in Ukrainian No 2, Feb 86 pp 79-87

[Article by Yu.M. Artyukh, candidate of chemical sciences]

[Abstract] This is a review of forty references, including three patents, to assess energy problems from a long-range perspective and to evaluate new technology and methods for sources of energy in the near future other than from petroleum. Data include a comparison of relevant properties of methanol, ethanol, and gasoline; effect of surface area and structure of the catalyst on the condensate composition (H_2O , CH_3OH , C_4H_9OH , C_2-C_7 alcohols) and productivity from CO and H_2 at 380-420°C using a zinc-chromium catalyst; dynamics of surface changes at different stages of catalyst formation from 220-440°C, their IR spectra and productivity. Selectivity of CO conversion into C_1-C_7 alcohols, CO_2 and H_2O as a function of pressure, temperature, and ratio of H_2 to CO is presented. A series of curves relating selectivity of either CH_3OH or C_3-C_7 alcohols as a function of H_2 to CO ratio for different pressures at 420°C is given. The published data provide a rich source of material on many factors for catalytic synthesis of alcohols, but a series of questions including preparation of effective and stable catalysts and development of an economic method for water removal need to be resolved. Figures 3, references 40: 32 Russian, 8 Western.

12886/13046

CSO: 1841/484

UDC 615.9.752

QUANTITATIVE DETERMINATION OF AFLATOXINS IN COTTON PROTEIN AND WASTE

Tashkent KHIMIYA PRIRODNYKH SOYEDINENIY in Russian No 6, Nov-Dec 85
(manuscript received 9 Jul 85) pp 843-844

[Article by G.V. Tarasyuk, M.T. Turakhozhayev, T.T. Shakirov and
R.A. Mirkina, Order of Labor Red Banner Institute of Chemistry of Plant
Substances, UzSSR Academy of Sciences, Tashkent]

[Abstract] Detection and quantitative determination of aflatoxins B₁, B₂, G₁, and G₂ in cotton grist processing products and in proteins obtained from them are described and discussed. Aflatoxins were extracted from 100 g samples by use of water-acetone solution and the extract was evaporated until dry. The residue was dissolved in chloroform, and quantitative determination was carried out by thin-layer chromatography. The cotton grist and proteins produced from it were contaminated by aflatoxins, but the quantitative level does not exceed the maximum permissible level for aflatoxin B₁ which is 5 µm/kg for all food products. References 2 (Russian).

2791/13046
CSO: 1841/483

UDC 633.88:615.283.926

SESQUITERPENES WITH PEROXIDE GROUP: NOVEL CLASS OF ANTIMALARIALS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D.I. MENDELEYEVA
in Russian Vol 31, No 1, Jan-Feb 86 (manuscript received 11 Mar 85)
pp 102-104

[Article by Ye.I. Khomchenovskiy, Institute of Medical Parasitology and
Tropical Medicine imeni Ye.I. Martsinovskiy]

[Abstract] In view of the demonstration that a substance derived from wormwood (*Artemisia annua*) has antimalarial activity with respect to *Plasmodium falciparum*, trials were conducted with this agent (artemisinin) and derived analogs of it on mice infected with chloroquine-resistant *P. berghei*. Artemisinin was best extracted with petroleum ether at 30-60°C and isolated by subsequent fractionation of the mixture on silica gel.

Reduction of artemisinin with hydrogen over $\text{Pd/Li}_2\text{CO}_3$ led to destruction of the peroxide bridge and inactivation, while reduction with sodium borohydride resulted in the formation of dihydroartemisinin with twice the antimalarial potency of artemisinin. Substitution of a variety of aromatic and nonaromatic groups for the =O on ring D led to a number of derivatives with greater activity than that exhibited by artemisinin. In all cases, the agents were active against the schizonts in the blood, but not in the tissues, or on the gametes. Figures 1; references 11: 2 Russian, 1 Chinese, 8 Western.

12172/13046

CSO: 1841/503

INFLUENCE OF TECHNOLOGY OF COMPOSITES ON MECHANICAL PROPERTIES OF CARBON-BASED PLASTICS

Minsk DOKLADY AKADEMII NAUK BSSR in Russian Vol 30, No 3, Mar 86
(manuscript received 11 Apr 85) pp 237-239

[Article by V.A. Dovgyalo, S.N. Zinovyev, K.P. Pomerantseva and
O.R. Yurkevich, Institute of Metallo-Polymeric Systems, BSSR Academy of
Sciences]

[Abstract] This paper evaluates the influence of the initial state of polyaminoimide binder on properties of carbon-fiber reinforced plastics. The binder was used either in a dispersed form (particle size under 200 μm) or dissolved in N-methylpyrrolidone. While tensile strength and modulus of elasticity were often comparable at 293°K, the differences became significant at higher temperatures. These parameters for composites formed with dispersed binder retained about 95% of their initial values at 523°K and about 65% at 573°K, while the same parameters for composites formed with solvated binder had only about 75% and 30% of their respective initial values at the same elevated temperatures. When the binder alone was hardened, samples from solvated binder also showed lower mechanical properties with increasing temperature. Apparently, physicomachanical interaction of the solvent with the binder resulted in traces of the solvent remaining in the product and inhibited the formation of spatially bound structures during hardening. The interaction of the solvent with the surface of the carbon filler facilitated the retention of solvent. Adsorption of the solvent by the carbon fibers was indicated by the higher temperature rise (about 50°K) when the filler was added to solvated binder compared to adding filler to dispersed binder (about a 35°K temperature rise). Residual solvent in the composite apparently initiates thermal decomposition of the polymer and so reduces its thermal stability. The use of dispersed binder can significantly improve the thermal stability of the mechanical properties of the composite and so is particularly attractive for high-temperature applications. Figures 2; references 1 (Russian).

12672/13046
CSO: 1841/504

MORPHOLOGY OF BLOCK POLYPROPYLENE WELDED COMPOUNDS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 286, No 5, Feb 86
(manuscript received 28 Jan 85) pp 1151-1155

[Article by L.I. Bezruk, G.B. Yesaulenko, G.N. Korab and I.A. Uskov,
Institute of Electric Welding imeni Ye.O. Paton, UkSSR Academy of Sciences,
Kiev]

[Abstract] A study of morphological transformations, occurring in joint welds of butts of 6 mm thick extruded polypropylene sheets is described and discussed. Samples were welded at 32°C, flashing off 25 s, and temperature pause less than 3 s. Weld pressure was varied from 0.05 up to 0.5 MPa. Morphological changes in the seams were studied with use of a complex of methods of interference-polarization microscopy in the visible region, wide-angle electronography, and electron-scan microscopy. Welding of the butts produce morphological changes in the seam involving appearance of some regions distinguished by their orientation, dimensions, and form of structural elements. The interface between the welded bodies may be morphologically apparent. It was assumed that welding of polymer materials involves a process of creating a permanent joint by a brief conversion of the welded surface into a state which ensures mutual adhesion. A diagram of the welded joint of butts depicts the process clearly. Figures 4; references 10: 3 Russian, 7 Western.

2791/13046
CSO: 1841/489

STUDY OF POLYURETHANE FOAMS AS CARRIERS OF MEDICINES

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR: SERIYA KHIMICHESKAYA in
Russian No 1, Jan-Feb 86 (manuscript received 27 Sep 84) pp 56-59

[Article by Ye.O. Batyrbekov, B.A. Zhubanov, L.B. Rukhina and
S.A. Moshkevich, Institute of Chemical Sciences, KazSSR Academy of Science,
Alma-Ata]

[Abstract] Results of synthesis of polyurethane foams based on complex oligoethers and hexamethylene diisocyanate are described and discussed and study of use of these foams as carriers of medicines (ethionamine, a specific antituberculosis preparation, and rifampicin, a broad spectrum antibiotic) in order to prolong their effectiveness is described. A two-stage method of synthesis of the soft polyurethane foams without any additive was devised in order to prevent toxic, allergic, or other undesirable effects. The medicines, placed within the polyurethane matrix, maintained their physiological activity and formed a macromolecular system with the polymer, which prolonged the effectiveness of the medicines. Figures 2; references 8 (Russian).

2791/13046
CSO: 1841/485

LOCALIZATION OF RADIATION DAMAGE IN POLYMETHYL METHACRYLATE

Moscow KHIMIYA VYSOKIKH ENERGIY in Russian Vol 20, No 1, Jan 86
(manuscript received 11 May 84) pp 32-37

[Article by G.S. Zhdanov, A.S. Smolyanskiy and V.K. Milinchuk, Scientific Research Physicochemical Institute imeni L.Ya. Karpov]

[Abstract] Studies were conducted on the mechanism of radiation damage to polymethyl methacrylate (PMMA) containing ca. 0.1-0.5% ethanol or methanol. The samples were irradiated at 77 and 300 K from a Co-60 source (ca. Gy/sec) with dosages ranging from 10 to ca. 700 kGy. Gamma irradiation at 77 K led to the appearance of alcoholic radicals in yields that were ca. 1.8- to ca. 2.2-fold greater than the macroradical yield from the initial PMMA. The predominant formation of radicals from ethanol or methanol points to the high efficiency of absorbed energy transfer to the additive molecules. At the boundary of the plasticized and unplasticized PMMA samples, visually apparent damage was observed in the forms of cracks and blisters. Alcohol vapor-treated PMMA surfaces gamma irradiated at 300 K with a ca. 300 kGy dose indicated that the alcohol molecules favor the localization of absorbed ionizing radiation in defective PMMA sites. This phenomenon leads to chemical transformations, further defects, and stresses in PMMA. The net effect is a lowering of the physical performance of the polymer. Figures 4; references 13: 9 Russian, 4 Western.

12172/13046
CSO: 1841/446

UDC 621.373.826:539.2

EFFECTS OF POWERFUL IR LASER EMISSION ON CHEMICALLY REACTIVE POLYMERS

Moscow KHIMIYA VYSOKIKH ENERGIY in Russian Vol 20, No 1, Jan 86
(manuscript received 21 Sep 84) pp 87-89

[Article by Yu.A. Bakhirkin, Yu.A. Bykovskiy, V.A. Ukraintsev and A.A. Chistyakov, Moscow Institute of Engineering Physics]

[Abstract] An analysis was conducted on the decomposition of cellulose nitrate films subjected to powerful IR lasers, employing in vacuo mass spectrometry for product analysis. With a neodymium laser ($\lambda = 1.06 \mu\text{m}$) the major products identified were N_2 , H_2O , CO_2 , CO, and NO, i.e., products characteristic of gaseous oxidation during burning of cellulose nitrate. With a CO_2 laser ($\lambda = 9.1-10.9 \mu\text{m}$) the mass peaks led to the identification of NO_2 , CH_2O , H_2O , CO, and NO. The product composition was virtually independent of radiation intensity; but showed that with an increase in the absorption coefficient (ca. 10 cm^{-1} for neodymium, $10^2-10^3 \text{ cm}^{-1}$ for CO_2 laser)

the relative yield of primary decomposition products (NO_2 , CH_2O) also increased. The latter observation indicated a decrease in the efficiency of secondary oxidative processes. Figures 3; references 2 (Russian).

12172/13046
CSO: 1841/446

UDC 541(64-15)+678-13

INHIBITION BY VINYL CHLORIDE (VC) OF LOW-TEMPERATURE RADIATION POLYMERIZATION OF TETRAFLUOROETHYLENE (TFE) IN GLASSY PERFLUOROALKANE (PFA) MATRIX

Moscow ZHURNAL VSESOUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D.I. MENDELEYEVA in Russian Vol 31, No 1, Jan-Feb 86 (manuscript received 14 Feb 85) pp 101-102

[Article by S.R. Allayarov, D.P. Kiryukhin, M.K. Asamov and I.M. Barkalov, Tashkent State University imeni V.I. Lenin; Institute of Chemical Physics Branch, USSR Academy of Sciences]

[Abstract] Calorimetric studies were conducted on the effects of VC on radiation polymerization of TFE in PFA, in view of the demonstration that the presence of VC in the matrix increases the crystalline phase concentration of TFE. Subjecting a TFE-VC-PFA system to Co-60 gamma-irradiation (8.3 W/kg) at 77 K was observed to decrease homopolymerization of TFE from 90 to 12% for a TFE(0.14 g)-PFA(1.0 g) system with 0.03 g VC. The VC-induced reduction in TFE polymerization was ascribed to the increase in the TFE fraction that was in the crystalline phase. Figures 4; references 4 (Russian).

12172/13046
CSO: 1841/503

POLYMERS FOR NEW TECHNOLOGY

Moscow TEKNIKA I NAUKA in Russian No 1, Jan 86 pp 27-29

[Article by M. Koton, corresponding member of USSR Academy of Sciences and director of Institute of High Molecular Weight Compounds, USSR Academy of Sciences, and Yu. Sazanov, doctor of chemical sciences and assistant director of Institute of High Molecular Weight Compounds, USSR Academy of Sciences]

[Abstract] Manufacture of materials with unusual properties is possible by utilizing new contemporary methods to alter existing known polymers. Polyarimides with prescribed properties were created. The polyarimides are strong and thermally stable and can be used in all kinds of technical materials in which polymers are used as solids. The work with polyarimides was very difficult and complex. Polyarimides can be obtained from all known

dianhydrides of tetracarboxylic acids. Theoretical and experimental studies showed that the structure of the dianhydride component had a very significant influence on the strength properties of the polyarimides. The properties of the polymers depend on their spatial structure. By introducing a "hinge" atom such as oxygen or sulfur into the diamine component, the polymer acquires great mobility. Such variations in the structure of the polyarimides causes changes in their physical properties. A four-category classification of the polyarimides was developed to relate structure to physicochemical properties for their practical application. The classification is based on the presence of "hinge" members in the polymer molecule and is as follows: A) polyarimides that do not contain "hinges," B) polyarimides that have "hinges" in the dianhydride component, C) polyarimides that contain "hinges" in the diamine component, and D) polyarimides with "hinges" in both components. Thermally stable film PM and thermally stable fiber Arimid were created. Some applications of the polyarimides are films used as tapes, metallic foils coated with polyarimides, condensers on a base of polyarimide film, conducting wire with polyarimide lacquer insulation, electric machinery with polyarimide lacquer insulation, and polyarimide fiber on bobbins. Areas for application of polyarimide materials are continually being expanded. They are already used successfully for calculating and measuring equipment and for radionavigation and radioastronomical properties. Figures 7.

12886/13046
CSO: 1841/471

UDC 678.5.003.15

PROBLEMS IN DEVELOPMENTAL PLANNING OF PLASTICS PROCESSING INDUSTRY

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 86 pp 3-6

[Article by G.M. Ozerov and M.F. Yakovlev]

[Abstract] Some consideration is given to planning further development of the plastics processing industry, in view of the increasing importance of this class of materials as a substitute for metal products. The new developments will encompass improvements in existing molding and extrusion machines, as well as design of new models with the advantages of full automation and computer-control. An increasing use of robots is anticipated to minimize the level of manual work which, in conjunction with implementation of automated control systems, will render the entire process of fabrication much more efficient and largely waste-free. Introduction of automated control systems has been estimated to render molding processes one hundred times more efficient on an overall basis: the requirements for raw materials will decrease by 5-8% and productivity will improve by 5-10% (and in some cases by 15-20%). Reductions in the size of machinery and energy utilization by the more efficient processing technologies will have nation-wide ramifications, and this itself indicates that planning the further development of the industry must rest securely on scientific advances.

12172/13046
CSO: 1841/511

DIMINISHING FLAMMABILITY OF RADIATION CROSS-LINKED POLYETHYLENE FOAMS

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 86 pp 15-17

[Article by A.V. Bobyleva, S.M. Berlyant and B.V. Nelyubin]

[Abstract] A variety of fire-retarding agents were tested for use in polyethylene foams cross-linked by radiation. The retarding agents were introduced into the melt at 130°C for 10-15 min to assure uniform distribution, with the samples pressed into 2 mm thick films at 148°C for irradiation by accelerated electrons (700 keV, ca. 7 mA) to deliver various dosage levels. Foaming was conducted with glycerol at 190°C. The optimal combination for diminishing flammability was represented by hexabromobenzene + decabromodiphenyloxide + Sb_2O_3 (Br:Sb = 3:1) delivered to a 20:100 (wt/wt) ratio with respect to polyethylene. The effectiveness of this combination was ascribed to the high T_m values of the halogen compounds (300-325°C), which exceeds the foaming temperature and, therefore, prevents their destruction. References 2: 1 Russian, 1 Western.

12172/13046

CSO: 1841/511

UDC 678.5:537.311

EFFECTS OF ADSORBED SUBSTANCES ON RADIATION-INDUCED CONDUCTIVITY IN POLYMERS

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 86 pp 22-25

[Article by O.S. Aleksanina and V.P. Sichkar]

[Abstract] Factors affecting radiation-induced electrical conductivity in polymers were studied in a system employing water-treated Teflon and fluoroplast F-4MB and heptane-treated high-density polyethylene (HDPE). The polymers were subjected to gamma irradiation from a Co-60 source to a 9 or 18 kGy dose, with the evaluation conducted in terms of the absolute value of the radiation-induced conductivity (A), and its dependence on absorbed dose (B). Preliminary treatment of HDPE with heptane resulted in a reduction of B of ca. 17% and in a 2-fold increase in A. Treatment of Teflon with water resulted in a 2-fold decrease in A without a significant change in B. The effects of water treatment on F-4MB were more pronounced than on Teflon (F-4), presumably due to repetition of the $-CF_3$ group in the former and its looser packing. The adsorption of low MW compounds was, therefore, seen to influence localization and mobility of excess charges under the influence of ionizing radiation. The extent of such influence is dependent on the structural characteristics of the polymers and the adsorbed molecules, with the localization of the excess charge largely predicated on local defects in the polymers. References 8: 7 Russian, 1 Western.

12172/13046

CSO: 1841/511

PROPERTIES OF POLYMERIC ELECTRETS FORMED IN CONTACT WITH DIFFERENT METALS

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 86 pp 30-32

[Article by I.M. Vertyachikh, Yu.I. Voronezhtsev, V.A. Goldade and L.S. Pinchuk]

[Abstract] Studies were conducted on the physical and mechanical characteristics of polymeric electrets formed by contact with copper and aluminum electrodes without the application of an external electrical field. Analysis of polyamide, pentaplast, polyvinyl acetal, and polyvinyl chloride samples prepared in this manner showed a 1.2- to 1.8-fold increase in strength characteristics, particularly in materials filled with glass fibers or polyethylene-terephthalate fibers (40%). The improvements in the physico-mechanical properties of these electrets were apparently due to an increase in the strength characteristics of the polymer itself, as well as to enhanced adhesiveness between the polymer and filler. Maximal polarization for the copper + polymer + aluminum electrical resistance system was obtained with a polymer thickness of 1.5 mm. In summary, electrical polarization of polymers by two different metal electrodes can be employed for markedly enhancing the strength, stability, and utility of such electrets. Figures 1; references 11 (Russian).

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CSO: 1841/511

PROSPECTS FOR PRODUCTION OF FIRE-RESISTANT POLYOLEFINS AND POLYSTYRENES

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 86 pp 51-53

[Article by T.A. Vasilyeva, E.N. Golovan and L.A. Korotneva]

[Abstract] A brief review is presented of current developments in the production of fire-resistant polyolefin and polystyrene plastics, and of indicative trends for the future development of the field. To date, halogen and phosphorus compounds have attained the greatest importance as fire-retarding agents in plastics, with Br derivatives being significantly more effective than the Cl congeners. Phosphorus compounds are even more efficient fire retardants, and various combinations of the P and Br compounds result in a significant decrease in the concentration of such agents that has to be used. Generally, fire-retardant compositions commonly in use with polyolefins, polystyrenes, and ABS resin are supplemented with Sb_2O_3 . The deleterious effects that the addition of fire-retardants have on the plastics can to some extent be overcome by introduction of thermoplastic styrene-butadiene or olefin elastomers, or by the use of fillers. The release of fumes during combustion has to a large extent been successfully controlled by

the addition of various oxides to the plastics, such as titanium oxide, molybdenum oxide, magnesium oxide, silicon dioxide, or magnesium or aluminum hydroxide. It appears that further developments in this area will come not from a search for new fire-retarding agents, but from modification of existing agents and improvements in the degree of their dispersal in the plastic substrate. References 14: 6 Russian, 8 Western.

12172/13046
CSO: 1841/511

UDC 678.5:404.9

ADHESIVE PRIMER

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 86 pp 56-57

[Article by V.A. Pravdivtsev]

[Abstract] An excellent primer compound has been devised which appears to overcome many of the difficulties encountered in applying adhesives to metal or plastic substrates. The primer is obtained by dissolving polyacrylic acid (MW 2000) in formamide up to a 20% concentration; this is reacted with AGM-9--a product of γ -aminopropyltriethoxysilane--at 100°C for 1 h. After the reaction, the solvent was eliminated by evaporation under vacuum, and the product dissolved in acetone. A 3% solution of the primer painted on a metal surface retained an epoxide resin adhesive with a strength of 120 N.cm⁻¹.

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RESISTANCE OF POLYMERS TO CLIMATIC CONDITIONS

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 86 p 63

[Article by G.Ye. Zaikov and O.N. Karpukhin]

[Abstract] An All-Union seminar on "Research Methods and Predictions of the Climatic Stability of Polymers, Composites and Their Products" was held in Yakutsk on September 18-21, 1985. The meeting was organized at an All-Union level by the Yakutsk Branch, Siberian Department, of the USSR Academy of Sciences, the All-Union Chemical Society imeni D.I. Mendeleev, the Institute of Physicotechnical Problems of the North, and the Yakutsk Center for Scientific and Technical Information. The meeting encompassed some 50 reports followed by extensive discussions. The key topics covered were the stability of various polymers, composite materials and their products in cold climates and the effects of moisture, and the theoretical and practical aspects of assessing their utility in such regions. The meeting

concluded with a decision to organize a special authoritative body to coordinate studies on materials testing in the various climatic regions of the USSR, and to publish the proceedings of this meeting.

12172/13046

CSO: 1841/511

EFFECTS OF ELECTRON RADIATION ON PHOTOCONVERTERS BASED ON Ge-Si SOLID SOLUTION

Tashkent GELIOTEKHNKA in Russian No 6, Nov-Dec 85 (manuscript received 14 Oct 84) pp 6-9

[Article by A.K. Abiyev and R.V. Shakhbazova, Radiation Research Sector, AzSSR Academy of Sciences]

[Abstract] Photoconverters were prepared from p-type monocrystals with an initial concentration of holes of $2-5 \times 10^{15}/\text{cm}^3$ by diffusing Sb into a 2-2.5 μm n-layer. The samples were irradiated with 3.5 MeV electrons. Doses of $10^{13}-10^{15}/\text{cm}^2$ significantly worsened the load volt-ampere characteristics, lowering the short-circuit current and decreasing the no-load voltage. The critical value of the integral flux of electrons was $2 \times 10^{14}/\text{cm}^2$, an order of magnitude higher than for Si-based converters. At this value, the short-circuit current dropped 20% and the no-load voltage 10%. The observed degradation was due to a drop in the lifetime of the minority carriers in the base p-n transition and a lessening of the collection coefficient as a result of radiation-induced defects interacting with contaminants and other defects to form recombination centers. Spectral sensitivity was also affected, with increasing dosage decreasing sensitivity in the long-wave portion of the spectrum, another indicator that the most significant radiation effects are in the base and not the diffusion layer. The coefficient of radiation change of lifetime of the minority carriers was 1.4×10^{-14} [sic] el $\mu\text{s}/\text{cm}^2$, an order of magnitude lower than for Si-based photoconverters. Ge-Si crystals have a much higher concentration of structural defects and a shorter lifetime for carriers, so the impact of radiation-induced defects is lower, and photoconductors based on Ge-Si solid solutions show improved radiation hardness. Figures 4; references 4 (Russian).

12672/13046
CSO: 1841/516

PHOTOELECTRIC PROPERTIES OF CdS<Gd, Cl> FILMS UNDER γ -IRRADIATION

Tashkent GELIOTEKHNIKA in Russian No 6, Nov-Dec 85 (manuscript received 7 Jul 84) pp 9-10

[Article by Sh.B. Atakulov, F.A. Zaitov and R.A. Sibagatullin, Fergana State Pedagogic Institute imeni Ulugbek, UzSSR Ministry of Education]

[Abstract] Films of CdS doped with both Gd (approximately 1%) and Cl were prepared by thermovacuum condensation on mica substrates. They were then subjected to thermal tempering, which increased their photosensitivity by several orders of magnitude. Samples were tested for resistance in darkness and for the ratio of change of resistance under illumination of 10^3 lux. Measurements were made between parallel indium contacts of 1.5-2 mm apart both before and after γ -irradiation by Co^{60} at an intensity of 1030 R/s at room temperature and were compared to measurements with films doped with Cd and Cl. The resistance in darkness stabilized at 10^7 R for the Cd<Gd, Cl> film, remaining essentially unchanged for dosages up to 10^9 R. Apparently, the radiation stimulated diffusive equalization of defects and dopant atoms, with the result that the relatively large Gd atoms ended up in stable crystal positions where the energy required to move them was larger than for the neighboring Cd and S atoms. For the CdS<Cd, Cl> film, the resistance in darkness continued to drop with increasing dosages and the ratio of the change of resistance under illumination dropped sharply at dosages above 10^7 R. Gd appears to have considerable potential as a dopant to stabilize the photosensitivity of CdS layers under γ -irradiation. Figures 1; references 6: 4 Russian, 2 Western.

12672/13046

CSO: 1841/516

EFFECTS OF CONSTRUCTION OF PLASMOCHEMICAL REACTOR ON ENERGY PARAMETERS OF HIGH FREQUENCY GLOW DISCHARGE

Moscow KHIMIYA VYSOKIKH ENERGIY in Russian Vol 20, No 1, Jan 86 (manuscript received 9 Jul 84) 56-60

[Article by V.P. Paderov, A.V. Volosov and S.A. Neustroyev, Moscow Institute of Electronic Technology]

[Abstract] An analysis was conducted on the effects of geometric factors in plasmochemical reactors for dielectric films on the energy and concentration of ions used in bombarding electrodes. In planar reactors with metallic walls, the distance between the electrodes has a significant effect on the energy of the ions and neutral particles. In existing reactors evaluation of the distance between the high frequency glow-discharge electrode and the

support, the energy of the ions is on the order of 50 to 200 eV. With geometrical modifications in the design, the average energy vs. distance plots indicate that the energy of the bombarding ions can be reduced to 15-20 eV with distances in the 100-300 mm range. Figures 4; references 11: 9 Russian, 2 Western.

12172/13046
CSO: 1841/446

UDC 389:006.063.065.7.001.4

CERTIFICATION AND REFINEMENTS IN TESTING SYNTHETIC RUBBER PRODUCTS

Moscow KAUCHUK I REZINA in Russian No 2, Feb 86 pp 28-30

[Article by L.M. Kazimirov, B.F. Raytsis and M.P. Sidorova]

[Abstract] A key problem in the testing and quality assessment of synthetic rubber products centers around the fact that the reliability and precision of such tests relies exclusively on the testing or measuring method itself. This is significantly different from the situation that relies on the availability of physical standards. As a result, an international convention has been established, on the basis of which testing is conducted as a two-step process. Initially, preliminary assessment of the accuracy of a testing method is based on the results from three to five laboratories, followed by definitive evaluation based on the results from five to 16 independent laboratories and the setting of certification of a method. New and unanticipated problems keep coming to light as, for example, the 1.5- to 2-fold disparity in the results obtained for weight loss determinations. The problem was finally tracked down to the number of samples placed in a drying chamber, location of sensors, physical disposition of the samples, etc. This fact illustrates the need for alertness in devising rigid standards for testing methods. References 4 (Russian).

12172/13046
CSO: 1841/512

UDC 678.4.(088)

INFLUENCE OF MODIFIERS ON COHESIVE PROPERTIES OF RESINOUS MIXTURES BASED ON ISOPRENE RUBBER

Moscow KAUCHUK I REZINA in Russian No 1, Jan 86 pp 20-23

[Article by N.A. Kokurina, A.G. Shvarts, A.A. Delektorskiy and B.F. Shklyaruk]

[Abstract] A study was made of the effect of modifiers RU, Oktofor 10S, Hexol 3V, and VI-1 (tetramethylenediethylenediamine) and combinations of them on the cohesive properties of resinous mixtures based on cis-1,4-polyisoprene. The RU modifier alone or in combination with VM-1 and Hexol 3V had no effect on the morphology of crystalline structures of synthetic isoprene forming on stretching. When Oktofor 10S and VM-1 were used, the load-elongation function changed considerably; an assumption was expressed that the resinous mixtures become partially structuralized. In general, increased cohesive properties of filled synthetic polyisoprene resulting from the modification with various agents is the result of the effect of these modifiers on the orientational crystallization of rubber. The greatest effect was observed with VM-1 modifier. Figures 4; references 15: 14 Russian (3 by Western authors), 1 Western.

7813/13046

CSO: 1841/476

NEW TECHNOLOGICAL PROCESSES IN MANUFACTURING OF TIRES

Moscow KAUCHUK I REZINA in Russian No 1, Jan 86 pp 2-5

[Article by P.F. Badenkov]

[Abstract] A principal factor in the intensification of tire industry is the improvement of tire quality. The cost of component materials amount to 80% of the production cost of a finished tire. The other 20% corresponds to labor costs. Therefore, increased wear of tires should result in economic savings. Progressive developments in the tire industry must consider updated methodologies and automation. Reconstruction and refitting of old plants must be done using the most modern technology. Domestic tire industry is based on synthetic rubber which yields tires fully comparable with natural

rubber products. Use of synthetic compositions makes it easier to automate the production. This aspect of automation is a recurrent theme throughout this paper. The vulcanization process is the last topic addressed; fundamental changes in construction of tires required improvements in this process and better precision in all other operations. Here again, automation is highlighted as the trend of the future.

7813/13046
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EFFECTIVENESS OF PRINCIPAL DIRECTIONS IN DEVELOPMENT OF MANUFACTURE OF LATEX ARTICLES

Moscow KAUCHUK I REZINA in Russian No 1, Jan 86 pp 35-37

[Article by D.P. Trofimovich, M.S. Troyanker and V.S. Malovitskiy]

[Abstract] The principal methods for intensifying the production and effectiveness of latex products are based on introduction of new equipment and modernization of the old one: continuous foam generator, washing and drying of the formed articles, drying ovens, pumps, mills, etc. Each of these steps could yield savings of thousands of rubles on the level of national economy. The principal topic, however, covered production of rubber gloves. Increased economic effect is achieved by development of new types of gloves with longer service time, two-layered texture, new cords, new polymers. Since only 50-75% of the need for rubber gloves are satisfied, longer service of the finished product should take care of these shortages. Foam rubber production for furniture articles is yet another area targeted for intensified production.

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HIGH TEMPERATURE CONTACT OXIDATION OF BUTADIENE-NITRILE RUBBER AND ITS ADHESION TO METALS

Moscow KAUCHUK I REZINA in Russian No 1, Jan 86 pp 13-16

[Article by D.G. Lin, I.M. Yelisseyeva and N.I. Yegorenkov]

[Abstract] Physicochemical changes of butadiene-nitrile and natural rubbers were studied during thermal oxidation in contact with metals and alloys along with the effect of oxidation on rubber adhesion to metals. It was shown that the highest degree of oxidation occurs on copper, the lowest on aluminum. Oxidation rate increased with temperature. Contact oxidation of the rubber on catalytically active metals was accompanied by transfer of metal particles

into the rubber body; in fact, this turns into a hetero-homogeneous catalytic reaction. In case of alloys, all catalytically-active elements are transferred. This transfer intensifies with increased formation of low molecular weight compounds during oxidative destruction. The adhesive strength between the rubber and metal depends on the metal, thermal conditions during oxidation of rubber, thickness of rubber film, and temperature of evaluation of adhesive compounds. Figures 5; references 17: 13 Russian (1 by Western author), 4 Western (1 by Russian authors).

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CURRENT STATUS AND POTENTIAL FOR PRODUCTION AND USE OF ELASTOMERS IN USSR

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D.I. MENDELEYEVA
in Russian Vol 31, No 1, Jan-Feb 86 pp 7-10

[Article by V.S. Fedorov, specialist, petroleum processing and petrochemistry]

[Abstract] A summary review is presented of the current status of elastomer production and use in the USSR, with an indication of anticipated future developments. Approximately 50% of all the synthetic elastomers produced in the USSR are represented by polyisoprenes, with 90% of the polyisoprenes available in the USSR represented by synthetic products (vs. 10% abroad). Intensive studies are being conducted to bring synthetic isoprene up-to-par with natural rubber in terms of physical and mechanical characteristics and, possibly, to exceed the latter. The USSR also produces a variety of other synthetic elastomers, some of which are suitable for special operations under a variety of conditions, e.g., a working temperature range of -110 to +300°C, ability to withstand 900 atm pressure, and stability in the face of aggressive chemicals. Recent years have also seen a development in the use of elastomers in everyday-use articles, such as shoes, clothing, eating utensils, etc. Of tremendous appeal and promise are studies on harnessing biotechnology for the biosynthesis of rubber under industrial plant conditions.

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CSO: 1841/503

COMPUTER-AIDED DESIGN OF OPTIMAL INDUSTRIAL RUBBER PRODUCTS

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D.I. MENDELEYEVA
in Russian Vol 31, No 1, Jan-Feb 86 pp 56-60

[Article by E.E. Lavendel, doctor of technical sciences, rector, Riga
Polytechnic Institute]

[Abstract] A brief review is provided of the problems encountered in computer-aided design of industrial rubber products with a family of special design programs. Generally, the computer time required is on the order of one- to two-fold greater than in the design of metal products. The latter complication is largely due to the material characteristics of rubber, such as deformability, instability under physical, mechanical, and chemical stresses, viscoelasticity, etc. The variety of programs that are currently in use utilize the Ritz method, method of final elements, and final boundary methods. The most widely used approach rests on a combination of the final element method with variance methods. The programs available in the USSR are entirely satisfactory for the task at hand, with any further refinements preferentially directed at making them more user-friendly. References 5 (Russian).

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CSO: 1841/503

USE OF RADIATION FOR MODIFICATION, HEAT TREATMENT AND VULCANIZATION OF RUBBER

Moscow ZHURNAL VSESOYUZNOGO KHIMICHESKOGO OBSHCHESTVA IM. D.I. MENDELEYEVA
in Russian Vol 31, No 1, Jan-Feb 86 pp 84-87

[Article by A.N. Ponomarev, doctor of chemical sciences, Laboratory Chief, Chernogolovka Division of the Institute of Chemical Physics, USSR Academy of Sciences]

[Abstract] A brief survey is presented of some of the more important uses of various forms of radiation for the modification, heat treatment and vulcanization of rubber in the USSR and the West. The overview points at the advantages of using electron accelerators and Co-60 gamma-radiation in the vulcanization process, particularly in the case of rubbers with unsaturated bonds to produce less expensive industrial rubber products. Other topics covered include the use of glow-discharge of simple gases, e.g., air, He, N, Ar, O₂, etc.) for modification of the surfaces of industrial rubber products, and the use of radiowaves and ultrahigh frequency waves (300-30,000 MHz) for vulcanization of tire and other rubber products. Figures 3; references 35: 27 Russian, 8 Western.

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CSO: 1840/503

RADIATION POLYMERIZATION IN PREPARATION OF BUTYL ACRYLATE LATEX

Moscow PLASTICHESKIYE MASSY in Russian No 3, Mar 86 pp 6-7

[Article by V.V. Polikarpov, V.I. Lukhovitskiy, R.M. Pozdeyeva, L.A. Krylova, V.G. Belyanin, A.V. Bryskovskaya, Ye.V. Gromov and Ye.I. Yegorova]

[Abstract] An assessment was conducted on the preparation of butyl acrylate latex by irradiation from a Co-60 source to effect copolymerization with acrylonitrile. In the temperature range of 25-30°C and gamma-radiation dose of 0.08-0.1 Gy/sec and a radiation time of 2 h, polymerization occurred largely on the latex particles, with the degree of grafting of acrylonitrile to butyl acrylate controlled by the reactant ratio. The radiochemical yield of the grafted chains per 100 eV of absorbed energy per 1 g of butyl acrylate was generally in the 0.9 to 1.5 range, based on the assumption that graft sites are formed only as a result of energy absorption. Viscometric studies of the products showed that manipulation of the reactant ratios yielded \bar{M}_v ($\times 10^{-5}$) values of 3.5 to 20-25. Radiation initiation, therefore, was demonstrated to be an effective approach in ensuring copolymerization in latex systems which are essentially refractory to initiation by conventional nonradiant means. Figures 1; references 10: 7 Russian, 3 Western.

12172/13046
CSO: 1841/511

PROGRESS IN SCIENCE AND TECHNOLOGY AS PRIMARY MOVING FORCE FOR NATIONAL ECONOMIC DEVELOPMENT

Moscow KAUCHUK I REZINA in Russian No 2, Feb 86 pp 2-5

[Article by V.B. Pavlov]

[Abstract] National economic development is largely based on advances in oil refinery science and petrochemistry, as this branch of economy provides both fuel and raw materials for the rest of industry. M.S. Gorbachev, at his June report to the CC CPSU, gave a realistic evaluation of the economic development of the USSR and provided scientifically-based concepts for the further development of Soviet economy based on progress in science and technology. One of the key developments leading to further progress is the development of continuous process and waste-free technology, with its attendant cost effectiveness and decreased dependence on manual operations. Further safety, economies, and automation will come from increased reliance on robotics and computer-based monitoring systems. In the final analysis, however, it is the research, design, and construction organizations that will determine the course of future progress of industrial development in the USSR, as they are charged with solving the fundamental questions pertaining to the application of science to technology.

12172/13046
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PROTEIN EFFECTS ON STRUCTURE AND PROPERTIES OF NATURAL AND SYNTHETIC ISOPRENE RUBBER

Moscow KAUCHUK I REZINA in Russian No 2, Feb 86 pp 12-14

[Article by N.A. Mikulenko, L.Ye. Poluektova, L.V. Masagutova and V.F. Yevstratov]

[Abstract] In order to assess the effects of proteins on the structure and properties of natural and synthetic isoprene rubber, comparative physical, chemical, and IR-spectroscopic studies were conducted on both. Subsequent evaluation involved protein removal from natural rubber and addition of protein fragments to the synthetic samples, and retesting. The collated observations demonstrated that a reduction in the protein content of natural rubber has virtually no effect on cohesiveness, but diminishes resistance to tearing, wear out, and stability. However, the elasticity and hysteretic characteristics of such rubber show an improvement. Introduction of petrochemical protein fragments into the synthetic isoprene rubber, which resulted in chemical binding of the proteins to polyisoprene molecules, improved resistance to tearing, increased the degree and rate of vulcanization, and enhanced viscoelastic properties. Hysteresis was not significantly affected, possibly due to the low protein content. The fact that introduction of protein fragments into synthetic rubber has a positive effect on its characteristics opens the way for future improvements in the product. Figures 4; references 4: 3 Russian, 1 Western.

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PROCESSING AND USE OF RECLAIMED RUBBER IN PRODUCTION OF INDUSTRIAL RUBBER PRODUCTS

Moscow KAUCHUK I REZINA in Russian No 2, Feb 86 pp 35-39

[Article by L.A. Novikova, V.I. Mironova and I.V. Krishtal]

[Abstract] A survey is presented of the processes employed the world over in the processing and re-use of reclaimed rubber in the production of industrial rubber products. The survey is based on data in the patent literature, scientific journals and other publications, and proprietary information provided by private firms. Basically, the processing of reclaimed rubber products rests on three technical approaches, consisting of mechanical grinding for reduction to powdered or particulate form, regeneration and devulcanization, and combustion in an inert or chemically reactive medium. Data are provided on the use of the various forms of regenerated rubber in the different products, their cost effectiveness, and their suitability as

fillers. Pulverization remains one of the more active research areas, with new machinery being designed to produce powders with controlled dispersity. References 63: 1 Czech, 1 Polish, 1 Romanian, 26 Russian, 34 Western.

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UDC 678.017:678.02

ORGANOBORON COMPOUNDS--ANTIOXIDANTS FOR RUBBER MIXTURES AND VULCANIZATES

Moscow KAUCHUK I REZINA in Russian No 2, Feb 86 pp 42-43

[Article by L.A. Meylakhs, R.A. Gorelik and V.A. Dorokhov]

[Abstract] Organoboron compounds were tested as antioxidants in SKI-3 (synthetic isoprene) rubber for the prevention of aging at 70°C. Addition of small concentrations of boron adamantane or of dipropylboryl-1-(N-phenyl-carbamoylaminopyridinate) stabilized the characteristic viscosity of SKI-3 in toluene when heated for 5 h at 70°C, while samples without the organoborons showed a 1.6- to 2.5-fold decrease in viscosity. Vulcanization of SKI-3 at 143°C for 30 min in the presence of either compound, and subsequent physicochemical testing after heat aging, again demonstrated that these agents promoted the formation of rubber with superior characteristics vis-a-vis rubber lacking these antioxidants. Both agents, therefore, can be recommended for further evaluation as aging-resisters in rubber products. References 3 (Russian).

12172/13046
CSO: 1841/512

SOVIET EXHIBIT IN BULGARIA

Moscow KAUCHUK I REZINA in Russian No 2, Feb 86 p 47

[Article by N.P. Longinova]

[Abstract] An exhibit entitled "Progress in Soviet Science and Technology" was held in Sofia, Bulgaria, as part of the festive Days of Soviet Science and Technology program. The exhibit consisted of some 800 displays covering the full spectrum of Soviet industry, science, and agriculture. There were displays of the use of polymers in medicine, of automated control systems designed for manufacturing systems, and the latest in agricultural technology, as well as examples of new convenience items for domestic use. The entire exhibit was complemented by appropriately chosen films and video displays, and provided confirmation of expanding Soviet-Bulgarian cooperation in the sphere of science and technology.

12172/13046
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INFLUENCE OF NATURAL POLYSACCHARIDES ON EXTRACTION OF POLYCYCLIC ARENES
FROM SEA WATER

Tallinn IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 35,
No 1, Jan-Mar 86 (manuscript received 4 Feb 85) pp 40-47

[Article by Natalya Irkha, Ekha Urbas and Uuve Kirso, Institute of Chemistry,
ESSR Academy of Sciences]

[Abstract] Brown alga *Fucus Vesiculosus* is widespread in the Baltic Sea. Samples collected in the Strait of Finland near Kaberneeme had an average sodium alginate content of 38% by dry weight. After fixing the algal pigment with formalin, the alginate was extracted by washing, in turn, with 0.2 N sulfuric acid, distilled water, 1% sodium carbonate solution, and ethanol. Two experiments were then carried out with benzo(a)pyrene (BP), a typical carcinogenic polycyclic arene. In the first, 6 mg of the sodium alginate was dissolved in 100 ml of saline solution (5.6 g NaCl/l), 7.50×10^{-7} g BP in ethanol added, and the solution extracted with hexane after 1 hr of continuous stirring. Only 49.6% of the BP was lost, compared to 75.0% in a control, indicating the alginate protects the BP, possibly by screening it from dissolved oxygen. In the second experiment, 20 mg of the alginate was dissolved in 2000 ml of the same saline solution, buffered to pH 7.5. BP in ethanol was added to concentrations of $1.4 - 3.5 \times 10^{-10}$ mole, typical for pollutant levels in natural sea water. Green alga *Enteromorpha intestinalis* (40 g), collected near Merivyal, was then added and the batch held for 45-60 min under 2600 lux illumination. Samples were removed at regular intervals, extracted with hexane, and the amount of BP measured by quasi-linear luminescent spectroscopy. Then the alga was dried, minced, and extracted with benzene. BP was determined in the extracts by both fluorescent and chromatographic methods. The BP concentration changed more slowly in the presence of *Enteromorpha* when alginate was present, with only 36.9% oxidized in 1 hr, compared to 41.4% for a control sample. Experiments were also conducted with *Fucus*, allowing it to absorb BP from solution and then placing it in fresh solution together with *Enteromorpha*. Chromatographic analysis indicated the *Fucus* was able to accumulate and hold BP without metabolizing it, while a variety of metabolites were identified in the *Enteromorpha*. Figures 5; references 16: 10 Russian, 6 Western.

12672/13046
CSO: 1841/510

EFFECT OF ORGANIC IMPURITIES IN NATURAL WATER ON FORMATION OF TOXIC VOLATILE HALOGEN ALKANES DURING WATER CHLORINATION

Kiev KHIMIYA I TEKHOLOGIYA VODY in Russian Vol 8, No 1, Jan-Feb 86
(manuscript received 10 Jul 84) pp 37-41

[Article by L.I. Gyunter, L.P. Alekseyeva and Ya.L. Khromchenko, Scientific Research Institute of Public Water Supply and Water Purification, Moscow]

[Abstract] The effect of organic compounds present in natural water on the nature and level of volatile halogen-organic compounds being formed and detection of substances responsible for chloroform formation in drinking water after chlorination of natural waters are described and discussed. Hydroxy compounds, having one or more carbonyl groups in the meta-position or para-position as well as compounds containing phenol hydroxyl groups capable of producing a mesomeric effect with formation of carbonyl compounds, may be responsible for chloroform formation during water chlorination. The concentration of petroleum products in natural water has a significant effect on the chloroform level in drinking water. Study of model aqueous solutions of petroleum products, prepared in natural waters from two reservoirs with pH 8.0 and pH 6.9 and purified by use of 6 mg of chlorine per liter showed that an increase of concentration of petroleum products in the water increases the chloroform level in it after chlorination. An increase of pH of the solution increases the chloroform level. Figures 3; references 9: 3 Russian, 6 Western.

2791/13046
CSO: 1841/499

NEW DEVELOPMENTS IN DESIGNING PLANTS AND EQUIPMENT FOR PURIFICATION OF EFFLUENTS

Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 86
pp 9-11

[Article by V.P. Temnikov and A.S. Kosyakov, engineers]

[Abstract] At this time a new water purification plant is about to be completed at the Lenin Fitting Plant imeni Lepse. A diagram of the production-fire fighting water line is shown. Step-by-step process was described, including introduced innovations. The capacity of this plant is 6,400-7,200 m³/day. Many of the steps are automated, their operation being controlled by the water levels in the reservoir. Water is treated with chlorine, copper sulfate, and sulfuric acid to prevent bacterial growth on the equipment parts. Figures 1.

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UDC 630*284.62.001.7

INTENSIFICATION OF RESIN PRODUCTION

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 1,
Jan-Feb 86 pp 2-3

[Article by A.P. Petushkov and T.V. Luneva, Ministry of Forestry, RSFSR]

[Abstract] Discussion of means to increase turpentine extraction calls for efficient use of the raw material base, improvement of organization of labor, and improvement of technology. Measures for promoting turpentine production increase include use of resin formation and resin secretion stimulators, improvement and extension of the brigade form of labor, and improvement of efficiency of transportation of workers. Figures describing productivity increase are presented and discussed briefly. Some outstanding collectives and excellent individual workers are mentioned. Use of "Yantar," a resin secretion stimulator which has produced a two-fold increase of labor productivity, is discussed. The advisability of returning to the use of sulfuric acid as a resin-secretion stimulant is also discussed.

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STAGES OF IMPORTANT JOURNEY (50TH ANNIVERSARY OF HYDROLYSIS INDUSTRY)

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 1,
Jan-Feb 86 pp 7-9

[Article by I.K. Cheremukhin and V.V. Ryabov]

[Abstract] Highlights from the history of USSR hydrolysis industry in the beginning period at the time of the first Five-Year Plans and during World War II are presented. The 1960's saw changes which set the stage for today's hydrolysis industry which is now a major subsector of the microbiology industry comprising 38 hydrolysis enterprises, 2 scientific research institutes, and 3 design organizations. The industry now produces more than 50 products, including multi-ton production of fodder yeasts, furfural, ethyl alcohol, carbon dioxide, and xylite. Effective measures introduced in the

11th Five-Year Plan include: a method of hydrolysis with separate extraction of pentose and hexose hydrolysates, a modified method of hydrolysis with extraction from a central zone through suspended filters, different methods of two-phase furfural-hexose hydrolysis with use of concentrated sulfuric acid at the furfural stage, and with use of monocalcium phosphate at the second stage. Other developments include: methods of hydrolysis of cotton husks for furfural-hexose cooking with use of mixed percolation, automation of nutrient salts production, optimization of the yeast-growing process, automation of the system of preparation and feed of pulp cooking acid into hydrolysis apparatus, improvement of furfural hydration on a fixed layer of a catalyst, regimes of operation of wash columns without forced feed of reflux bottoms, and installation of 1300 m yeast-growing apparatus with eight diffusion vessels instead of the usual five. Measures are now being taken to lead the hydrolysis industry into the 12th Five-Year Plan by intensification of production, re-equipping of operating plants, and acceleration of scientific and technical progress. Emphasis will be placed on problems related to the Food Program. Plans include organization of plant-carbohydrate fodder production and new plants; development of a preparation for treating intestinal diseases in man and animals; a protein-enriched fodder product, and fodder additives produced by means of radiolysis of nonfood plant raw material.

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CONTINUOUS HYDROLYSIS OF PLANT MATERIALS DILUTED BY SULFURIC ACID IN A TUBULAR REACTOR OF IDEAL DISPLACEMENT

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 1, Jan-Feb 86 pp 11-14

[Article by N.V. Chalov, All-Union Scientific Research Institute of Hydrolysis]

[Abstract] This is a discussion based on data from the literature, the author's own experience, and results of work on a tubular reactor of ideal displacement. It presents a recommendation for hydrolysis of pulp-form plant material in such a reactor in order to use apparatus with high unit capacity, to ensure high monosaccharide yield, and to accomplish complex conversions of raw material with production of furfural and a solution of monosaccharide. Work on continuous hydrolysis, being carried out in the USSR and abroad, is described and assessed. Scientific and engineering data concerning the prospects of continuous hydrolysis of plant material confirm its suitability for practical use. A series of investigations of the kinetics of the reaction by studies at 205-220°C and 230-240°C in reactors with tubes of 10.9, 40.9, 145, or 240 mm diameter, with productivity up to 0.5 t/hr for wood, reconfirmed this. The possibility of conducting continuous hydrolysis at 200-220°C and reaction duration of 5-10 minutes for wood chips of standard

granulometric composition has been demonstrated. Performance of continuous hydrolysis at 230-240°C and sulfuric acid concentration of 1 percent or more reduces the reaction to 14-20 seconds if automation conditions which ensure strict observance of the regime within fractions of a second are devised. References 24: 18 Russian, 6 Western.

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UDC 630*864.1:659.235

EXPERIMENT IN USE OF LIGNIN AS FUEL

Moscow GIDROLIZNAYA I LESOKHIMICHESKAYA PROMYSHLENNOST in Russian No 1,
Jan-Feb 86 pp 25-26

[Article by F.I. Trenina, new technique engineer, Tavda Hydrolysis Plant]

[Abstract] A lignin-drying device designed by Hydrobiosintez in 1970 and designed to dry lignin with a moisture content of 65 percent in a 1300 mm diameter tube drier, using a mixture of flue gases from lignin combustion in a cyclone furnace and recirculation gases, has been in operation since 1979. After modifications (listed in text), the device was brought up to design capacity (20.1 tons of crude lignin per hour) and is now operating efficiently and safely. Savings of conventional fuel by use of the device amounted to 33,984 tons from 1980-1984 which is equivalent to 41,444 tons of Kuznets coal. The economic impact from use of the device is more than 200,000 rubles. A layout diagram of the device is accompanied by a description and discussion of the operating procedure. Control of the drying process and feed of the dry lignin to a thermal electric power plant is described and discussed. Figures 1.

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EXPLOITATION OF PAPER INDUSTRY WASTES

Moscow KHIMIYA I ZHIZN in Russian No 2, Feb 86 pp 38-42

[Article by Z.M. Shevchenko, candidate of chemical sciences]

[Abstract] Annually, several million tons of lignin are collected as waste. Lignin is a natural phenol-type polymer. It is an active polymer and could be converted into useful substances. In the Arkhangelsk Forestry Institute, lignin is used as a filler in production of rubber. There are other applications, but lignin must be in the sulfate form for such utilization. The sludge lignin obtained as a precipitate in various purification systems is another problem. Even this byproduct could be used in many ways, but instead it is just stored as a waste. At the Zaporozhe yeast plant, the

hydrolyzed lignin is converted into a primer which allows painting even over rusted surfaces. However, it is the only plant involved in such project. Hydrolyzed lignin resembles peat. It could be used to replace peat in many ways instead of just being treated as waste. A mixture of lignin and another waste--chicken droppings--yields excellent compost. There are many other possible applications which need only proper scaling up. Most recently, it is viewed as a starting material for aromatic compounds. All the components are there to find a rational and effective solution for the lignin problem. References 3 (Russian).

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CSO: 1841/445

MISCELLANEOUS

UDC 002.513.5+681.3

AUTOMATED CHEMICAL DATA BASE RETROKHIM

Tallinn IZVESTIYA AKADEMII NAUK ESTONSKOY SSR: KHIMIYA in Russian Vol 35, No 1, Jan-Mar 86 (manuscript received 15 Aug 85) pp 72-74

[Article by Mare Liyk, Ilona Kyrgema, M. Korv and G. Rayalo, Institute of Chemistry, ESSR Academy of Sciences]

[Abstract] Because of the large amount of time spent by scientists and engineers in literature searches, a technical and scientific information data base RETROKHIM for chemical bibliographic and patent information was established in the Institute of Chemistry of the ESSR Academy of Sciences. It is based on an ES 1022 computer with a 512 kilobyte memory operating with the following peripheral equipment: six magnetic disk drives ES 5061, each with 29 megabyte capacity; four magnetic tape drives ES 5010; a display station ES 7920 with six terminals; and an ES 7032 printer. It uses an ASOD [not defined, but cited to a 1978 source] software package allowing rapid search combining such data elements as author, citation, keyword, year, and UDC. Requests can be modified or further delimited while in progress. Preliminary searches can be done simply by title, keyword, or UDC. A sample search is given using both an English and a Russian term. Data on magnetic tape will come from two basic sources: bibliographic/key word data from the All-Union Institute of Scientific and Technical Information (24 files a year) and patent information from the Scientific Industrial Center (52 files a year). These data will be transferred to a magnetic disk. Because of equipment limitations, at present only 1/10 of the bibliographic/key word data and 1/40 of the patent data will be entered, and it will be limited to four years of data. Data will include specific themes in six basic subject areas: synthetic organic chemistry, general and theoretical organic chemistry, chromatography and mass spectroscopy, processing solid fuels, physical chemistry, and mathematical modeling of chemical engineering processes. Currently, the data base has 17,000 bibliographic/key word citations and 21,000 patent citations. Specialized program-oriented data bases are envisioned for organic synthesis and for integrated exploitation of oil shale. References 3 (Russian).

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